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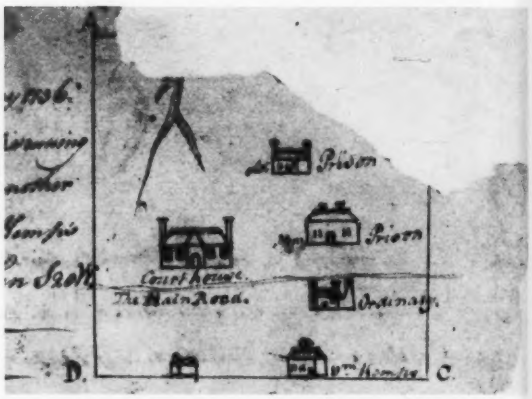
The Early County Courthouses of Virginia

MARCUS WHIFFEN Colonial Williamsburg

THE county courthouse is a conspicuous feature in the Virginian scene. Sometimes, thanks to the incorrigible rurality of Virginia, it stands way out in the fields with little or nothing near it save the other county buildings, the clerk's office, and the jail, in the walled square (fig. 1).[1] Sometimes it stands, more conventionally to non-Virginian eyes, in a county town. There are a hundred county courthouses altogether in Virginia, and rather more than a third of them were built before 1850.[2] As a class the latter have never received—at least in print—half the attention they deserve, and that must be my excuse for offering this brief and tentative account of their history.

Every early courthouse in Virginia, it would appear, was built by general contract. But the preliminaries varied, and changed in the course of time. In the colonial period the parties to the contract were usually the builder or 'undertaker' and the justices themselves. The architectural historian must be grateful for that state of affairs, because it sometimes resulted in the agreement being entered in the court books; but it does not necessarily help him to identify the designer of the building. Sometimes it was decided at the start that the new courthouse was to be copied from the existing courthouse of some other county; for instance, the Chesterfield courthouse of 1749 was 'to be of the same Dimensions and like materials as the present Courthouse of Henrico County',[3] and the second Caroline courthouse was built in 1759–1765



1. Survey plan of Gloucester courthouse square, made in 1754.

by John Wiley after 'the style and dimensions' of the courthouse at King and Queen.[4]

After the Revolution, when a courthouse was to be built the procedure was for the court to appoint commissioners, numbering perhaps six or eight, to decide upon a plan and let the contract. In some cases these commissioners had to report back when the plan had been chosen or when the contract had been let; in others they had full charge of affairs until they received the finished building and handed it over to the court. In any case their deliberations between their appointment and any reports that they might be required to make were private, and were not entered in the court books. So more often than not the source of the design remains a matter for conjecture. One may be able to learn the name of the contractor from the books, for he had to be paid; but the fact that the contractor was capable of designing the building does not mean that he did so. Often, no doubt, the general design should be attributed to one or more of the commissioners, who would produce rough sketch plans, such as those for the Nelson County courthouse of 1809 (fig. 2).[5]

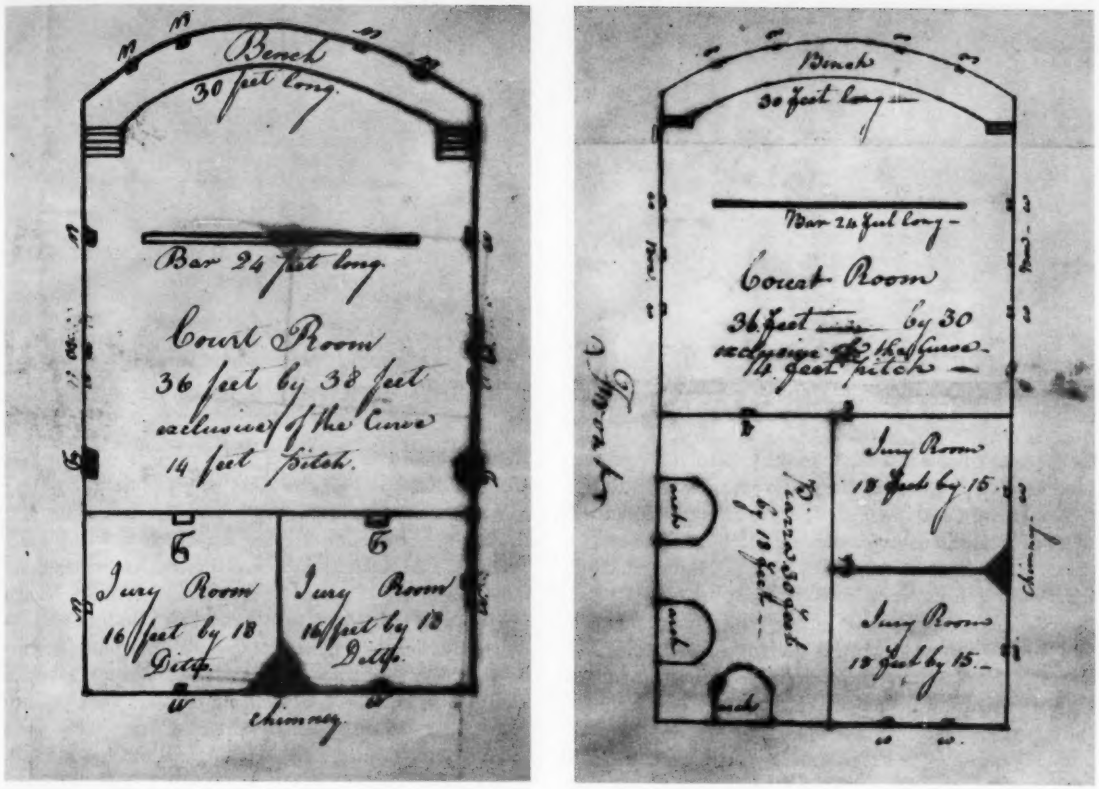
1. The plan reproduced is from Gloucester County Surveyor's Book A, 1733–1810, p. 32 (County Clerk's Office, Gloucester Courthouse).

2. Without having seen all the buildings and examined all the records—and I cannot pretend to have seen all even of the buildings that are unquestionably early in the sense in which the word is here used—it is impossible to give an exact figure. The Virginia Writers' Project guide, *Virginia* (New York, 1940), is often extremely inaccurate in its dating of courthouses. For instance, it dates the present Lancaster County courthouse 'about 1800', when in fact it was built 1858–1860, Fluvanna County courthouse, Palmyra, 1838 instead of 1829–1831, Powhatan 'about 1817' instead of 1849–1850, and Greensville County courthouse, Emporia, 1787, though it was clearly rebuilt in the second half of the nineteenth century.

3. F. E. Lutz, *Chesterfield: an Old Virginia County* (Richmond, 1954), pp. 88–89. Both courthouses have gone. That of Chesterfield was burnt by the British in 1781; a photograph of its successor (destroyed in 1917) is reproduced *ibid.*, facing p. 83.

4. T. E. Campbell, *Colonial Caroline: a History of Caroline County, Virginia* (Richmond, 1954), p. 169.

5. With two others (not reproduced) they were found among the papers of a Major Massie, who was one of the commissioners, and are now in the collection of the Virginia Historical Society.



2. Sketch plans for Nelson County courthouse, 1809 (Courtesy of Virginia Historical Society).

With the usual specification of materials to be used, thickness of walls and so on, such plans were quite sufficient for the purpose of letting the contract.

The plans for Nelson County courthouse show the essential parts of the Virginian county courthouse during the period that concerns us; namely, the courtroom with its raised bench and bar, and the room—here rooms—for the jury to retire to. One of them also shows a piazza, of which more presently. By the time the county court system was established in Virginia, equivalent English courts were sitting, as they had been for centuries past, in a variety of buildings. There was therefore no contemporary English model of obvious suitability for imitation in the colony, and the first Virginian courthouses were hardly distinguishable from dwelling houses. One might borrow the words used in a Virginian Act of Assembly of 1647 to describe 'sufficient prisons', and say that they were 'built according to the ordinary forme of Virginia houses'.[6] Such was the frame courthouse that James Orchard agreed to build for the justices of Richmond County in 1692: 'a good Substantial new Courthouse, well & workmanlike of Twenty foot in breadth & thirty in length, a foot Jett on each Side, with an Inside Chimney Ten foot Pitch—double Rafters & Studs, with foure Girders, groundcils & out side Posts'.[7]

It is the more to be expected that the earliest courthouses should take this dwelling-house form when it is remembered that even the fourth of the colony's statehouses at Jamestown was of dwelling-house form,[8] though not precisely of 'the ordinary forme of Virginia houses'. In the first Capitol at Williamsburg (built 1701–1705) the elements of the dwelling-house statehouse were preserved but were duplicated,[9] with the addition of two features that were to be much imitated in county courthouses, the so-called 'piazza' and the semicircular ends of the wings containing the chamber of the House of Burgesses and the General Courtroom.

The piazza had been introduced into Virginia a little before the Capitol was built, in the first building of the

6. W. W. Hening, *The Statutes at Large: being a Collection of All the Laws of Virginia* (Richmond, 1810–1823), I, 340.

7. Richmond County Court Orders, quoted in *William & Mary Quarterly*, 2nd series, V (April 1925), 128–129.

8. H. C. Forman, *Jamestown and St. Mary's* (Baltimore, 1938), pp. 171–173.

9. M. Whiffen, *The Public Buildings of Williamsburg* (Williamsburg, 1958), pp. 34–35, 50.

3. Hanover County courthouse, *c.* 1734 (photo: author).

4. King William County courthouse, *c.* 1734 (photo: author).

College of William and Mary. In the Capitol it served as a kind of lobby both to the Burgesses' chamber and to the General Court, and it was no doubt the latter use that led to its adoption in county courthouses. Three of these, in which it takes the form of a loggia extending the full length of the front, have survived from the early 1730s: the courthouses of Hanover, King William, and Charles City counties (figs. 3, 4, 5). A fourth, the second courthouse of York County, was destroyed in 1814, but is known to us from documentary references and from its excavated foundations.[10] All four resembled the letter T on plan, and the three survivors are very close indeed to each other in dimensions. York County courthouse was slightly larger. That of Hanover is well preserved outwardly,[11] and stands free of later buildings. King William courthouse, which might be its twin, is also in good shape. The third of the survivors, Charles City courthouse, has been radically though not irremediably altered in recent times; the arches have been filled in and the orientation of the courtroom has been reversed, so that the entrance is now at the foot of the T, so to speak, where the justices' bench used to be.

The builder of the 1733 York County courthouse was Robert Ballard, a carpenter. The records of Hanover, King William, and Charles City counties for the period in which their courthouses were built are lost to us, and the builders therefore are not known. It is worth note, perhaps, that Charles City courthouse has water-table moldings of the same profile as those of William Byrd's contemporary Westover nearby, and also shares with that house the locally uncommon feature of segmental window arches. But since the builder of Westover is not known this does not take us much further. York County courthouse was distinguished from the other three—but related to the Capitol—by its possession of windows with semicircular heads (compass windows). A question posed by the similarity of the four buildings is whether one of them was the model for the other three, or whether all four had a common prototype. My own guess is that the latter was the case, and that the common prototype, the missing link between them and the Capitol, was the James City courthouse of 1715 at Williamsburg.[12] But, since we know nothing at all of the character of that building, it is only a guess.

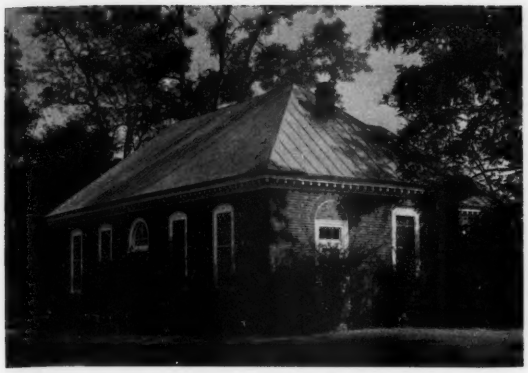
The Richmond County courthouse of 1749, at what is now Warsaw, had two piazzas. It was a single-story building, measuring about forty feet by fifty on plan, with a loggia of six arches, now walled up, in each of its longer sides. The contractor, and as likely as not the designer, was the planter Landon Carter, owner of Sabine Hall.[13]

10. E. M. Riley, 'The Colonial Courthouses of York County, Virginia', *William & Mary Quarterly*, 2nd series, XXII (October 1942), 402–406, with plan facing p. 402.

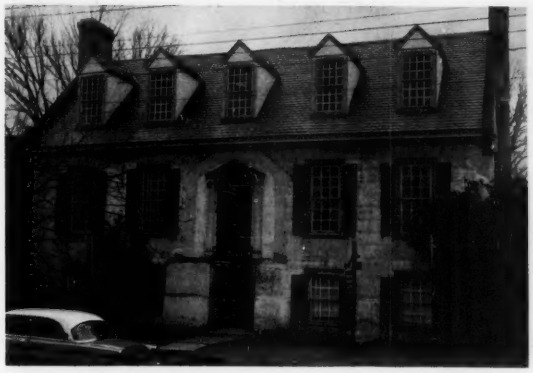
11. No colonial courthouse in Virginia retains its original furnishings. Moreover, documentary evidence as to the character and arrangement of those furnishings is very scarce. Most of what little there is will be found in Whiffen, *Public Buildings*, p. 161. An entry in Richmond County Court Orders, 1739–1752, p. 257, dated 6 August 1750, records that the Sheriff was then ordered to employ some person to rail in a yard around the courthouse 'and to sett up four Benches in each of the Piazzo's and one under each of the Windows in the body of the Courthouse of a Covenient hight and Breadth for people to set on'. Evidently—and it is as one who would have expected—the public part of the court was quite uncluttered. The Richmond County Court order books, in common with all the other county court books hereafter quoted, are available on microfilm in the Virginia State Library, Richmond.

12. Whiffen, *Public Buildings*, p. 152.

13. At first he was only to build an addition to the earlier courthouse. In August 1748 it was 'Agreed by Landon Carter Esq^{r} and the Gent: Justices Now Sitting that the s^{d} Carter Build an Addition to this Court house According to the Model Lodgd in the Clerks office, for Which the said Justices are to Pay him When finish'd in the best Manner, one hundred & thirty Pounds Curr^{y} Money & Allowing him the old Bricks and Glass Now in this Court House' (Richmond County Court Orders, 1739–1752, p. 144). Then under the date 6 March 1748–1749 there is the entry: 'An Agreement Between the Court and Landon Carter Esq^{r} was this day Confirmed for the Building of a New Court house According to the plan Lodgd, instead of Repairing the old one. for w^{ch} said Building when Compleatly and



5. Charles City County courthouse, finished 1736 (photo: author).



6. Isle of Wight County courthouse, Smithfield, 1750–1751. Street front (photo: author).

The other feature of the Capitol that entered courthouse design, the semicircular end of the General Courtroom, seems to have been adopted outside Williamsburg first in 1726. In August that year the justices of Norfolk County contracted with Peter Malbone for a courthouse 'To be thirty two foot long inside and Twenty foot wide inside and Arched to the westermost End all walled of Brick and morter of good Lime'.[14] Subsequent references in the agreement make it clear that the 'arch', in which there was to be an oval window, was in fact a rounded end; while there is a specific reference to the Capitol when it is stated that the seats for the justices and the bars are to be 'In the Same manner as in the General Court house'.[15] Fourteen years later, in 1740, the same feature appears in the specification for Lancaster County courthouse, this time called a 'compass end'. The building, for which James Jones was the undertaker, was to be of brick, 'thirty eight foot in Length and twenty five foot in bredth from out to out fourteen foot pitch within the house from floor to floor, one compas End'.[16] Both the Norfolk courthouse of 1726 and the Lancaster one of 1740 were destroyed long ago, and so for the oldest existing example of the feature we must go to the former Isle of Wight courthouse at Smithfield, built in 1750–1751 by William Rand (figs. 6, 7). This building was altered in the 1780s and again shortly after 1800, when it ceased to be the county courthouse. The courtroom with its rounded end extends out to the back.[17]

In the second half of the eighteenth century the arcaded piazza was discarded, but the T-plan continued in use. The courtroom formed the stem of the T, while the arms contained jury rooms. Gloucester courthouse, built in 1766, is a good specimen (fig. 8). The present Ionic portico was added late in the nineteenth century, but there was evidently a smaller porch of some kind before this, and indeed, as a glance at the spacing of the door and windows will convince one, from the beginning. The courthouse of James City County and the City of Williamsburg, built in 1770, was to have had such a portico from the first, although owing to circumstances unknown it never received its columns (fig. 9). Here the portico turns the T-plan into a cross-plan. This is a building of some interest, and its design is controlled, as I show elsewhere,[18] by a carefully applied system of mathematical proportion. Neither the designer nor the builder is known; since the plan was available for inspection when tenders were advertised for, it is evident that they were different men. A late example of a courthouse with a portico applied to the center of the front, in what one may broadly call the Palladian manner, is that of Cumberland County (fig. 10). This was begun in 1818, the builder being William A. Howard.[19]

Eighteen years before this Cumberland courthouse sent up, in the year 1800, a new type of courthouse made its first appearance in Virginia. At least 1800 is the date of Fairfax County courthouse,[20] which would seem to have been the first example of the type (fig. 11). We may

well done the said Carter is to be paid three hundred Pounds. So much of w^{ch} Sum is to be paid him this Ensuing Summer as the thirty thousand p^{ds} of Tob^{o} Already Levied for that purpose will Raise' (Court Orders, p. 159).

14. Norfolk County Wills and Orders, 1723–1734, under date 19 August 1726.

15. Incidentally, this shows that the furnishing of the General Courtroom in the reconstructed Capitol at Williamsburg, where chairs and not seats are provided, is incorrect in that respect.

16. Lancaster County Court Order 8, p. 287. The agreement and the specification, which is detailed and interesting, are printed, not altogether accurately, by E. C. Peirce, 'Courthouses of Lancaster County, 1656–1950', *Northern Neck Historical Magazine* 1 (December 1951), 29–30.

17. At the time of writing, a restoration is in progress. The photograph reproduced here was taken in 1955, before it began.

18. Whiffen, *Public Buildings*, pp. 157–160.

19. Cumberland County Order Book, 1818–1821, p. 89.

20. This is the date given upon the building. Fairfax County Order Book, 1799–1800, has lost the pages upon which, according to its index, there were references to the courthouse.

7. Isle of Wight County courthouse, Smithfield. 'Compass end' of courtroom (photo: author).

8. Gloucester County courthouse, 1766 with later portico (photo: author).

9. James City County and City of Williamsburg courthouse, Williamsburg, 1770 (photo: author).

call this the town-hall type, because of its outward resemblance to a type of English town hall which presents to the street an arcade—for the piazza has returned—supporting a windowed wall and gable end above; the town hall of Blandford, Dorset, designed and built by John and William Bastard in 1734, is a distinguished example (fig. 12). The resemblance is, be it noted, only an outward one, for whereas in English town halls the great room is on the upper floor, in these Virginian buildings the court itself sits on the ground floor; sometimes there are jury rooms over the piazza, and sometimes the public part of the courtroom rises over it, like a theater.

The town-hall type of courthouse was very popular in the first three decades of the nineteenth century. In 1807 Nelson County got one, at Lovingston (fig. 13); neither of the plans reproduced (fig. 2) was adopted. In 1808 the justices of Caroline County received their new courthouse at Bowling Green (fig. 14) from the executors of John Hoomes deceased;[21] this is a more academic rendering of the theme, with the gable treated as a pediment, as in Blandford town hall. More than twenty years later, in 1829–1830, Madison County courthouse was built with a front of precisely the same elements as those at Bowling Green, but with some changes in the proportions to give greater height (fig. 15). Sussex County courthouse, built in 1825–1828, also follows the scheme so far as the central part of the front is concerned, but has flanking wings (fig. 16). The builder of this was one Dabney Cosby.[22]

By 1825, however, the town-hall type was by no means the latest thing: the Jeffersonian courthouse had arrived.[23] It is reasonable to suppose that Jefferson's Capitol at Richmond would in any event have begotten a progeny of temple-form courthouses sooner or later, just as the first Capitol at Williamsburg had begotten courthouses with piazzas and compass ends. But, as it happens, what would seem to have been the earliest Jeffersonian courthouses were designed by none other than Thomas Jefferson. We do not, it is true, know anything of the character of his first courthouse, designed in 1818 for Botetourt County, and destroyed in 1850.[24] In 1821 Jefferson designed the Buckingham County courthouse that stood at Maysville until 1869, and of this the plan has survived.[25] The order was Tuscan, and Jefferson characteristically substituted three sides of an octagon for the compass end (fig. 17). He sent in his design in July 1821. All but a

21. Caroline County Order Book, 1807–1809, p. 48.

22. Virginia Writers' Project, *Sussex County* (New York, 1942), p. 80.

23. This is not to say that no more of the town-hall type were built. The Middlesex County courthouse at Saluda, built after 1852, is one.

24. Jefferson designed it at the request of James Breckinridge, one of the visitors of the University of Virginia, and it stood at Fincastle. See S. F. Kimball, *Thomas Jefferson, Architect* (Cambridge, 1916), p. 80.

25. It was first reproduced by Kimball, *Jefferson*, plate 214.

10. Cumberland County courthouse, 1818 (photo: author).

year later he was informed by Charles Yancey, the commissioner who had approached him for a design: 'We have directed a wing on each side, of 16 feet sq. attached to the main building by an entry of eight feet with an arch on each side, flat roof and columns to the wings.' Jefferson did not object to these additions, but recommended: 'You should take care that the roofs of your wings do not rise so high as the bottom of your entablature.'[26]

Was Charlotte County also—to borrow the words of Mr. Yancey's first letter to Jefferson—'afforded the opportunity of saying that it had built upon a plan presented by Mr. Jefferson'? Tradition says that the answer is yes: one writer tells us that 'it has always been stated as a fact in the village that the building committee sent some of its members to Monticello to consult with the aged Thomas Jefferson about plans for the building',[27] and another earlier one adds circumstance in saying that five of them were sent.[28] The court order books naturally have nothing to say on the subject; they do record the appointment of the commissioners in September 1821 and the receiving of the building in August 1823, together with the builder's name, John Percival, and the cost, $5,362.61.[29] If not designed by Jefferson himself, Charlotte courthouse (fig. 18) was clearly designed by someone who was familiar with Pavilion VII at the University of Virginia, which has a hexastyle portico of the same order—Palladio's Doric.

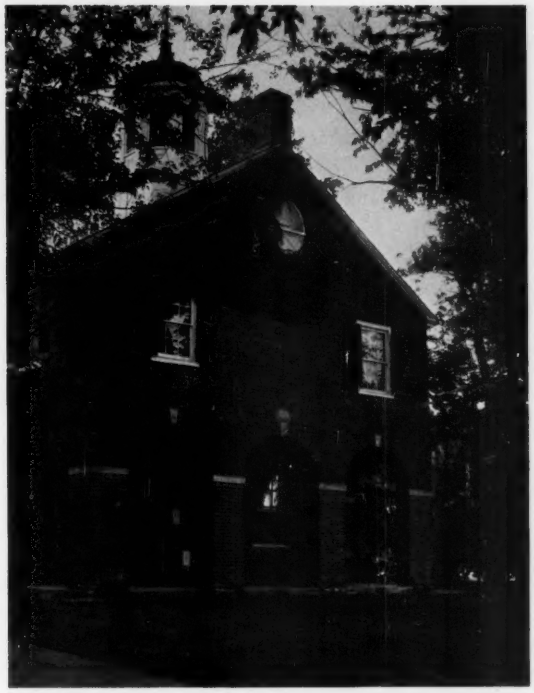
Whoever its architect, Charlotte courthouse was admired enough for a neighboring county to want one like it. In November 1823 the commissioners appointed to su-

26. Kimball, *Jefferson*, pp. 192–195.

27. R. F. Hutcheson, *Charlotte County, Virginia: Historic Sketch of Charlotte Court House* (Richmond, 1928), p. 14.

28. J. C. Carrington, *Charlotte County, Virginia* (Richmond, 1907) p. 21.

29. Charlotte County Order Book 23, 1820–1823, p. 116; 24, 1823–1826, p. 52.

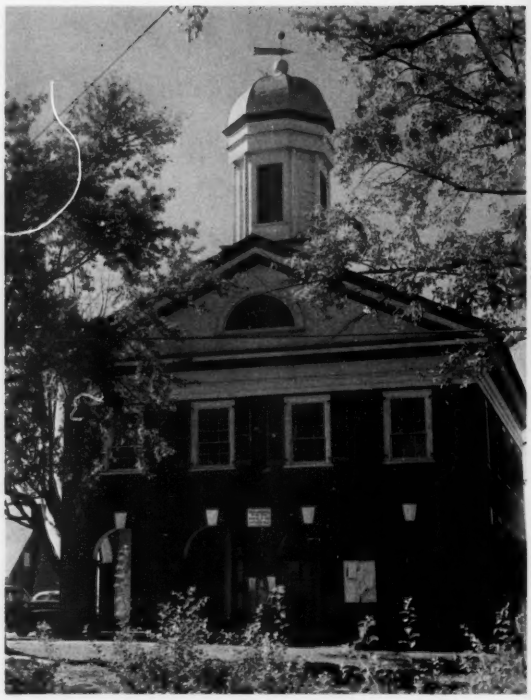


11. Fairfax County courthouse, 1800 (photo: author).

12. Town Hall, Blandford, Dorset, England, 1734 (Courtesy of National Buildings Record).

13. Nelson County courthouse, Lovingston, 1809 (H.A.B.S.).

14. Caroline County courthouse, Bowling Green, finished 1808 (photo: author).



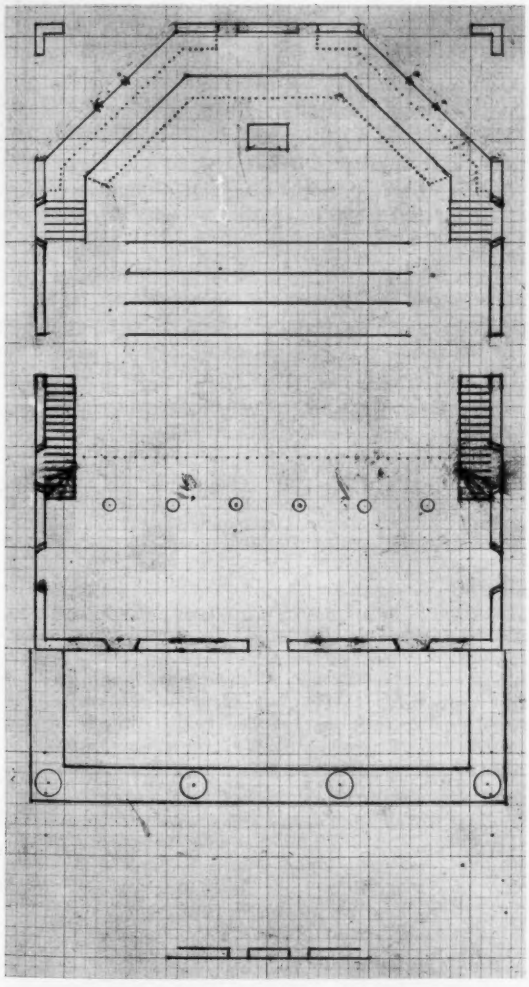
15. Madison County courthouse, 1829–1830 (photo: author).

pervise the building of a new courthouse for Lunenburg County were ordered by the justices, 'to advertise in the public papers that they will until the 20th day of December meet at Lunenburg Courthouse to receive proposals for building a new courthouse at this place which courthouse is proposed to be built after the plan of the new courthouse in Charlotte County'.[30] The finished building (fig. 19) was received and used for the first time in March 1827.[31] Of other Jeffersonian courthouses with which Jefferson himself was not personally concerned we may glance at a couple. Goochland courthouse (fig. 20) went up between May 1825 and August 1827; its builders were Dabney Cosby, whom we have already met as builder of Sussex courthouse, and Valentine Parish.[32] Nottoway courthouse (fig. 21) was begun in 1840, the contractor being Brand H. Ellington.[33]

Jefferson, as is well known, was always a Roman; the Greek Revival courthouses must therefore be treated as another category—our last. The earliest of them stands a mere thirteen miles from Monticello: the courthouse of Fluvanna County on the Acropolis, as Talbot Hamlin so

30. Lunenburg County Order Book 24, 1821–1823, p. 408.
31. Order Book 25, 1823–1827, p. 384.
32. Goochland County Order Book 31, 1825–1830, p. 169.
33. Nottoway County Order Book 11, 1832–1836, p. 152.

16. Sussex County courthouse, 1825–1828 (photo: author).

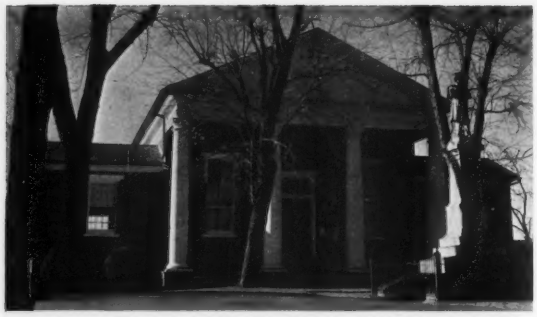


17. Buckingham County courthouse, Maysville, 1821. Plan by Thomas Jefferson (Courtesy of Massachusetts Historical Society).

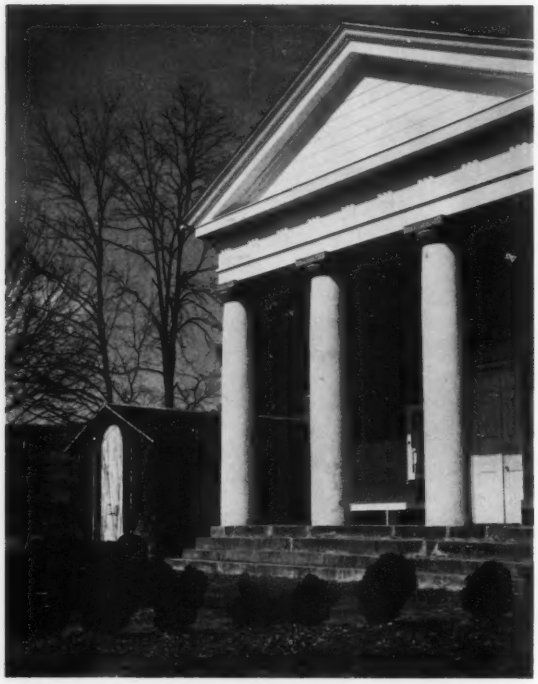
18. Charlotte County courthouse, 1821–1823 (Courtesy of Valentine Museum, Richmond).

19. Lunenburg County courthouse, 1823–1827 (photo: author).

20. Goochland County courthouse, 1825–1827 (photo: author).



21. Nottoway County courthouse, 1840 (photo: author).



22. Fluvanna County courthouse, Palmyra, 1829–1831 (photo: author).

23. Powhatan County courthouse, 1849–1850 (photo: author).

well described it,[34] at Palmyra (fig. 22). There is reason to believe that Fluvanna County courthouse was designed and built by the owner of the most Jeffersonian house not designed by Jefferson—John Hartwell Cocke of nearby Bremo.[35] The evidence is in the court order book: this records that Cocke was one of the commissioners appointed to draft 'a plan or plans' in 1829,[36] but was not among them when they reported that they had let the contract in 1830;[37] nor was he on the committee appointed to superintend the building work.[38] In 1831, however, shortly after the courthouse had been finished, he reappears, having contracted to enclose the courthouse according to his own plan and specification.[39]

Fluvanna County courthouse has a naïveté which one may find more attractive than the more bookish style of later Greek Revival courthouses. There were not many of them in Virginia until mid-century, and Powhatan County courthouse may stand for the whole class (fig. 23). It was built in 1849–1850 by Lewis Johnson of Hanover County, 'according', the order book tells us, 'to plans and drawings procured by Philip and George Cocke'.[40] The design is bookish in the full sense of the term, for it was evidently adapted from a design for a church in *The Builder's Guide* by Asher Benjamin, Doric being substituted for the trickier Ionic and the cupola left off.

And there we may leave the Virginian county courthouse. We have followed its development from the time when it was built 'according to the ordinary form' of a house, through the period in which it developed its own special forms, down to the time when it assumed the standard forms of Romantic Classicism. Its intrinsic merits are rarely of the highest order. But it is nearly always a pretty object in its setting, and as the only widely distributed class of public building in early Virginia that lent itself to architectural expression it supplies telling, and sometimes rather touching, evidence of the taste of the time and place.

34. T. Hamlin, *Greek Revival Architecture in America* (New York, 1944), p. 191.

35. For the building history of Bremo, and for Cocke as an architect, see S. F. Kimball, 'The Building of Bremo', *Virginia Magazine of History and Biography* LVII (January 1949), 3–13.

36. Fluvanna County Order Book, 1828–1831, p. 182.

37. Fluvanna County Order Book, 1828–1831, p. 262.

38. Fluvanna County Order Book, 1828–1831, p. 263.

39. Fluvanna County Order Book, 1828–1831, pp. 377, 385.

40. Powhatan County Order Book 28, 1848–1851, p. 308.

Giovanni di Gherardo da Prato's Designs concerning the Cupola of Santa Maria del Fiore in Florence

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RECENT discussions about the cupola of Santa Maria del Fiore, and early Italian architectural drawings in general, have not dealt in detail with a document of great interest for both of these topics.[1] In 1874 the valiant Cesare Guasti, archivist of the Opera Secolare di Santa Maria del Fiore and tireless researcher among the documents concerning the Florentine cathedral, announced the existence of a unique survivor from among the many and varied drawings and models mentioned in the records. It is a parchment sheet, irregular in shape and measuring roughly 48 cm.×67 cm., now in the Florentine State Archives without special signature and generally on display in the little-known and rather inaccessible permanent exhibition of the Archives (fig. 1).

Guasti published the document in part.[2] The Livornese architect Aristide Nardini, also an assiduous student of Santa Maria del Fiore,[3] provided Guasti with an explanation of the main drawing and its text which is fairly adequate. Neither Nardini's explanation nor Guasti's commentary, however, have exhausted the full significance of the document. Fabriczy, who worked in Florence a few years later, referred to Guasti's essay in his Brunelleschi monograph, but does not seem to have examined the original parchment.[4] Thereafter both the document and Guasti's publication practically disappeared from discussions of the cupola problem. It was exhibited without causing much interest at the Primo Congresso Nazionale di Storia dell'Architettura in Florence in 1936,[5] and last referred to without a special discussion by Prager.[6] To my knowledge no photograph of the document has ever been published.

Both the drawings and the text are the work of a well-

1. This work was carried out with the aid of a Fulbright Fellowship in Italy, 1956–1958. It was presented at the Renaissance session of the College Art Association meeting in Cleveland on 30 January 1959. A summary of the literature on the cupola is contained in W. and E. Paatz, *Die Kirchen von Florenz* (Frankfurt a.M., 1940–1955), III, 333 and notes. See also the recent article by P. Sanpaolesi, 'La lanterna di Santa Maria del Fiore e il suo modello ligneo', *Bollettino d'Arte* XLI (1956), 11–20, in which he identifies the well-known model in the Opera del Duomo with that approved in 1436, however without adducing new evidence. The most interesting recent publication about the cupola is the little-known article of Frank D. Prager, 'Brunelleschi's Inventions and the "Renewal of Roman Masonry Work" ', *Osiris* IX (1950), 457–554. See B. Lowry's letter to the editor, *Art Bulletin* XXXV (1953), 175 f. Contrary to Lowry, I disagree with almost all of Prager's conclusions, particularly with his interpretation of the documents previous to and, in part, after 1420. But he is the first to interpret correctly the main aspects of Brunelleschi's cupola program of 1420. Aside from his reconstruction of Brunelleschi's system of free-hanging centering and some revealing suggestions regarding his geometrical control of the arc of the vault, Prager's most significant point is the realization that Brunelleschi's program specified not six but three pairs of stone chains, namely, three in the inner and three in the outer shell of the cupola. The documents confirm his opinion that all three pairs of chains were actually built. It is, in fact, difficult to accept Sanpaolesi's theory that the 1420 program was not followed in practice, since officially accepted building programs could not simply be abandoned or changed without the express approval of the *operai*. P. Sanpaolesi, *La cupola di Santa Maria del Fiore* (Florence, 1941), *passim*. See also the cogent comments in Prager, 'Brunelleschi's Inventions', p. 482, n. 52. That something of this nature could have occurred without leaving the least trace in the relatively abundant documents of the period is unbelievable. The documents affirm just the contrary. Compare also G. C. Argan, *Brunelleschi* (Verona, 1955), pp. 56 f.

For early Italian architectural drawings, see Wolfgang Lotz, 'Das Raumbild in der italienischen Architekturzeichnung der Renaissance', *Mitteilungen des kunsthistorischen Institutes in Florenz* VII (1956), 193 f.

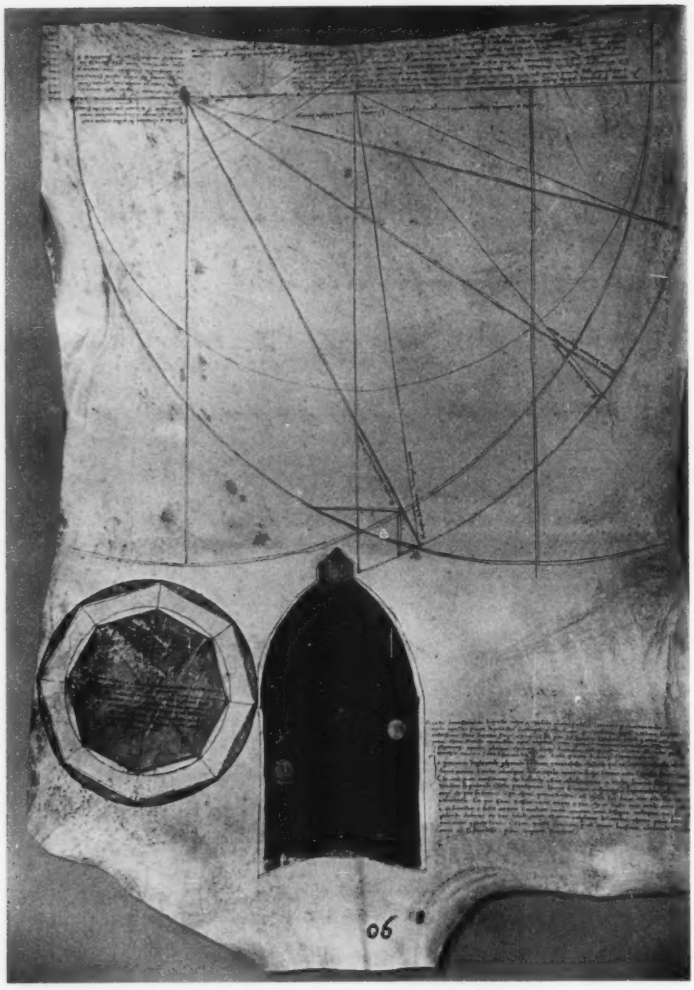
2. C. Guasti, *Belle Arti, Opuscoli Descrittivi e Biografici* (Florence, 1874), pp. 107–128. A part of the text was photographically reproduced in C. Pino and G. Milanesi, *La Scrittura di Artisti Italiani* (Florence, 1876), I, pl. 17, with comments by Guasti. Guasti's original publication is, unfortunately, not only among the *rariora* of Florentine scholarship, but his transcription of the text is incomplete and the lithographic plate accompanying the essay gives no more than an idea of one of the three drawings on the parchment. While a generally accurate reproduction, some of the measurements on the original have been omitted.

3. A. Nardini Despotti Mospignotti, *Filippo di Ser Brunellesco e la Cupola del Duomo di Firenze* (Livorno, 1885), pp. 46–47.

4. C. v. Fabriczy, *Filippo Brunelleschi* (Stuttgart, 1892), p. 91, n. 2, and p. 125, n. 2.

5. R. Niccoli, 'Elenco dei Disegni Antichi Esposti alla Mostra Brunelleschiana in Palazzo Vecchio a Firenze, Ottobre-Novembre 1936', *Atti del 1° Congresso Nazionale di Storia dell'Architettura* (Florence, 1938), p. 285. Also R. Salvini, 'Arnolfo e la Cupola di Santa Maria del Fiore', *Atti*, pp. 25 f.

6. F. D. Prager, 'Brunelleschi's Patent', *Journal of the Patent Office Society* XXVIII (1946), 122, n. 28; and Prager, 'Brunelleschi's Inventions', pp. 549 and 553. I see no reason to accept Prager's opinion that Ghiberti sided with Giovanni di Gherardo's arguments. See R. Krautheimer and Trude Krautheimer-Hess, *Lorenzo Ghiberti* (Princeton, 1956), pp. 254–256.



1. Giovanni di Gherardo, drawing with suggestions for construction of cupola, Santa Maria del Fiore, Florence (Archivio di Stato, Florence).

known Early Renaissance personality, Giovanni di Gherardo da Prato, born about 1360 and died sometime after 1442.[7] Giovanni was a rather typical humanist of his time, his thorough literary training being balanced by scientific and architectural interests. His best years were in the 1410s and 1420s when he was both Dante lecturer at the Florentine university,[8] and substitute *provveditore* of the cathedral.[9] He is named with respect, called 'prudens vir', and paid for various opinions, designs, and models regarding the cupola and the stone chains.[10] On 28 February 1426 he received ten gold florins 'per sua faticha e merce, per lui messa nell'Opera appiu disengni e uno modello di tera recho all'Opera predetta a dimostrare el modo di piu chose s'avevano affare nella Chupola maggiore'.[11]

While the 'modello di tera' has not survived, the 'disengni' seem to be at least in part identical with the drawings on our parchment, and the internal and external evidence tends to confirm this hypothesis.

Three designs cover the parchment. They are drawn in brown and red ink over still faintly visible silverpoint construction lines with yellow, blue, green, and purple tempera washes.[12] Long explanatory notes, written in neat fifteenth-century humanist minuscule with the usual ligatures and abbreviations, accompany the drawings.

7. Guasti, *Belle Arti*, pp. 109 f.

8. Concerning the Florentine University, see R. Davidson, *Geschichte von Florenz* (Berlin, 1927), IV, part 3, 142 f.

9. Guasti, *Belle Arti*, pp. 109 f.

10. C. Guasti, *La Cupola di Santa Maria del Fiore* (Florence, 1857), Docs. 46, 60, 75, 178, 179.

11. Guasti, *Cupola*, Doc. 60.

12. I wish to thank Dr. Annegrit Schmitt, Munich, who examined the document with me and extended useful information concerning the drawing technique.

Two of the designs and their text share roughly one half of the sheet between them, while, facing in the opposite direction, the larger third figure takes up the other half with its text next to and under it. The relationship of the figures on the parchment has a certain importance in the interpretation of the text.

Of the two figures on one side, the right-hand one represents a separate though not entirely unrelated problem. It is a somewhat loosely drawn perspective section showing three faces of the interior of the octagon and cupola of Santa Maria del Fiore (fig. 2). A ray of sunlight, originating in a faded (or deleted?) sun face is shown entering through the circular window at the right, casting its light on the opposite pier below the tambour. The particular purpose of this drawing is made clear by Giovanni's explanation.

This drawing is meant to demonstrate the following: if the sun should enter the window without being interrupted by glass and was broken on the opposite pier, it would light [the octagon] by reflection. Now, does anyone think that this reflection is of such force that it would reflect upwards a distance of more than seventy braccia. I am certain that it would not. All reasoning makes this clear to me and you could find it [written] in the treatises *De Speculis* and *Prospettivis*.[13] Now imagine how much light the windows will give when the light is interrupted by glass. You have an example of that in Santa Liperata in the front windows over the doors.

I, Giovanni di Gherardo Gherardi, make known and manifest that, having been asked here to give my opinion concerning the vaulting of the cupola, I would say in the first place regarding the form: that it seems to me, considering that from the windows up to the lantern is a distance of about seventy braccia vertically, if the vault (sesto) that has been begun without providing for light by means of windows or openings is continued further upwards, it would not be in total darkness (buia) but dark and shadowy. It is already five years or more since I submitted my design according to which 24 windows would have been made directly over the cornice [at the base of the cupola]. My design is still here in the *opera*. Should someone reply that if there is need [of more light] one could [make openings] by piercing (talgliare) the vault, I would say that this was said by a fool of small understanding. I have written this in order to be blameless if nothing should be done about this problem. For God's sake, take care of it.[14]

Giovanni's suggestion, which was probably made sometime before he was paid for it on 28 February 1426, seems to be referred to in the joint report of Brunelleschi, Ghiberti, and Battista d'Antonio to the *operai* and the consuls of the Arte della Lana on 24 January 1426:

We make no special suggestions regarding the light because the illumination from the eight windows below seems to be adequate. But if, in the end, it seems that more light is required, this could easily be increased (argomentarlo) higher up near (a lato) the lantern.[15]

Giovanni's arguments about the lack of light had little effect. Not only were extra windows found unnecessary, but in 1442 Brunelleschi joined in the opinion of Paolo Toscanelli: '. . . abbino a essere piu tosto ad adornezze che per lume' and voted for stained glass windows for the tambour.[16]

More interesting than the actual problem under discussion is Giovanni's illustration. Though hardly a constructed perspective, it is a far cry from Villard de Honnecourt's view of the interior of the choir of Reims and not very different from later perspective sections in the Codex Coner and the sketchbooks of Giuliano da Sangallo.[17] The section shows three sides of the octagon, the tambour, the cupola, and a rather curious lantern. Conspicuously missing are the double-shell system and all other details specified in Brunelleschi's program of 1420. Simplified as it is, Giovanni's lantern is nearly identical with the cupola lantern in the well-known painting attributed to Andrea di Giusto in the Johnson Collection, Philadelphia, also datable around 1426.[18] This combination of apparently unrelated facts demands further analysis.

Nothing in any of the designs on our parchment or in the accompanying text suggests that Giovanni is presenting his own idea of what the church should look like, though the semicircular niche at the base of the octagon

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13. Giovanni is referring to some of the various optical treatises circulating in Florence in the 1420s, most likely the *De Speculis* and *Perspettiva* of Roger Bacon. See G. Nicco Fasola, 'Svolgimento del pensiero prospettivo nei trattati da Euclide a Piero della Francesca', *Le Arti* v, (1942), 59 f.; and P. Sanpaolesi, 'Ipotesi sulle conoscenze matematiche statiche e mechaniche del Brunelleschi', *Belle Arti* (1951), pp. 25 f.

14. Questa dimostatione di questo ochio e chel sole uentri (e) no(n) sia i(n)terrotto p(er) invetriame(n)to, ma | nella opposita parte depilastri sirompa (e) dia lume p(er) refressione. or pe(n)si ciascuno se quella | rifressione sara ditatto forza cheuadi i(n) su piu di braccia setta(n)ta credo (e) certo essere mi | pare cheno secondo mimostra ogni ragione come potrai trouare nel trattato de Speculis (e) i(n) P(ro)spettiuis. opensa adu(n)que che lume liochi daranno q(ua)n(d)o p(er) uetro illume sia rotto potete | lexemplo auere i(n) Sa(n)ta Liperata ne(li oc)hi dalla parte dinanzi sopra leporti. Io giouanni di gherardo gherardi fo noto (e) manifesto, chesendo qui nellopera richiesto a dire | ilmio parere i(n)torno aluolgere della cupola, come io dicho i(n)torno accio i(n) questa forma p(ri)ma | Che amè pare, considerato che dalliochi i(n)fino alla lanterna a circha braccia sessanta p(er)pe(n)diculare, sequitando il sesto principiato sanza finestra o ispiraglio di preuedere allume i(n) | anzi che piu su si muri i(n)p(er)o cheno(n) preuedendoui no(n) chella sia buia, ma ella sia oscura | (e) tenebrosa. Et gia sono passati anni cinque (e) piu che io diedi mio modo accio (e) facea | 24 finestre i(n) sulla cornice i(n) meditate enne ancora mio disegno nellopera qui. Et ris|po(n)dendo aalcuno che dice sebisognera esipotra talgliare dellauolta, chemipare detto din | gniorante (e) pocho sauio. Ofatta questa scrittura p(er) no(n) auere biasimo adiuendo che sopra | accio no(n) si p(re)uedesse. p(er)dio uogliate p(ro)uederui.

15. Guasti, *Cupola*, Doc. 75: Non si dicie alcuna cosa de'lumi, perche s'imagina vi sara lume assai per gli otto occhi di sotto: ma se pure nel fine si vedesse bisognasse piu lume, si puo argomentarlo dalla parte di sopra agievolmente a lato a la lanterna.

16. Guasti, *Cupola*, Doc. 202.

17. Examples in W. Lotz, 'Das Raumbild', *passim*.

18. M. Salmi, *Masaccio*, 2nd ed. (Milan, 1948), p. 227, pl. 217. Both are similar to the lantern of the church in the celebrated fresco of the 'Militant Church' by Andrea Bonaiuti, 1365–1366, in the Spanish Chapel, Santa Maria Novella.

seems to be a simplification of the apsidal arms as executed. His section is an illustration of what the church will look like if the existing model is followed, and everything points to the fact that the view is a direct reflection of that model. The question is: which model? It can hardly be the Brunelleschi model of 1420 whose most conspicuous features were the double-shell and stone-chain systems and which probably did not include the lower parts of the octagon at all.[19] Nor is it likely that the illustration reflects one of the various rejected proposals for the cupola that came into the *opera* in 1418–1420. In 1407 Giovanni d'Ambrogio, then *capomaestro*, made a model of one of the arms flanking the main octagon,[20] but this has nothing to do with our illustration. This leaves only the church model of 1367. This model was not only made binding on all future builders in 1368, but all other then existing models were ordered to be demolished.[21] There is no report to the effect that the 1367 model was ever destroyed.[22] It was newly sworn to as late as May 1421,[23] or a year after the official acceptance of Brunelleschi's program which represents, above all, a technical solution to the problems raised by the 1367 least until 1429 when Brunelleschi, Ghiberti, and Battista d'Antonio were ordered to make a new model of the whole church.[24]

If this hypothesis is founded, a number of interesting possibilities present themselves. The evidence of the documents alone led Nardini, Guasti, and others to the conclusion that all formal aspects of the construction had already been determined by the model of 1367.[25] This would certainly include the specification of the 'quinto acuto' curve of the cupola, and earlier writers were surely right in taking Giovanni's statement that this curve 'has already been suggested for decades' as confirmation of this assumption.[26] Giovanni's illustration would seem to confirm these views. Prager proposed that the tambour and its windows were a new structural idea of Brunelleschi's. Brunelleschi, however, is completely on the periphery during the years around 1410 when the tambour was actually built.[27] All the documents support the theory that the tambour as executed was an integral part of the 1367 model. A close scrutiny of Guasti's documents actually leads to the simple, but nevertheless novel, conclusion that the key innovation which distinguished the model of the artists of 1366–1367 from that of the competing architect Giovanni di Lapo Ghini, and from all previous projects, lay precisely in the introduction of the tambour.[28] If the models of 1367 and 1420 were not in formal conflict, it was perfectly logical for Giovanni to turn to the 1367 model of the whole church when intending to represent a part not necessarily included in the 1420 model.

Giovanni's drawing also suggests that the lantern was planned in 1426, but that its exact form was still more or less undetermined. Whatever the significance of the church in Andrea Bonaiuti's fresco of 1365–1366 in the Spanish Chapel at Santa Maria Novella,[29] the lantern idea seems to have preceded the artist's model of 1366–1367. But it would probably be the very simple provisional version of the lantern in the 1367 model which is reflected in Giovanni's rendering and the painting in the Johnson Collection.

Most significant is the insight that Giovanni's illustration may give us into what a late mediaeval model might have looked like. Allowing for Giovanni's weakness as a draftsman, it seems nevertheless possible to conclude that the model was extremely simplified, with all parts reduced to the essential minimum. This is suggested by the crude form of the cornice under the cupola and by the lantern. Such a model could hardly have served as a guide for every detailed measurement required in the course of building. In any event, such problems had to be specifically reassessed as they arose. The model was 'pro forma', 'pro exemplo', and represented the 'veritas' of the project.[30] It

19. Prager, 'Brunelleschi's Inventions', *passim*. Brunelleschi's model of 1419–1420 seems already to have included his early conception of the lantern (Guasti, *Cupola*, Doc. 20). The complete reconsideration of the lantern problem after 1432 (Guasti, *Cupola*, Docs. 264–273) strongly suggests that he did not develop these early ideas in great detail.

20. C. Guasti, *Santa Maria del Fiore* (Florence, 1887), Doc. 440.

21. Guasti, *Santa Maria*, Doc. 192.

22. Prager's statement that the model of 1367 was 'officially destroyed' ('Brunelleschi's Inventions', p. 537) is unfounded. None of the documents including those cited by Prager (Guasti, *Santa Maria*, Docs. 484, 485, and Nardini, *Filippo*, pp. 58 f.) confirm anything of this kind.

23. Nardini, *Filippo*, p. 58.

24. Nardini, *Filippo*, p. 58; Guasti, *Cupola*, Doc. 61. This new model was to include side chapels to buttress the walls of the nave 'as in Santa Trinita' (Guasti, *Cupola*, Docs. 61–67, 259).

25. Guasti, *Santa Maria*, p. CXIII. Nardini, who, however, wrote without full knowledge of the documents published shortly afterwards by Guasti and based his work partly on a mistaken interpretation of the report in the history of Marchionne di Coppo Stefani (Guasti, *Santa Maria*, Doc. 82), went so far as to deprive Brunelleschi even of the double-shell idea. See also Paatz, *Kirchen*, III, 459 f.

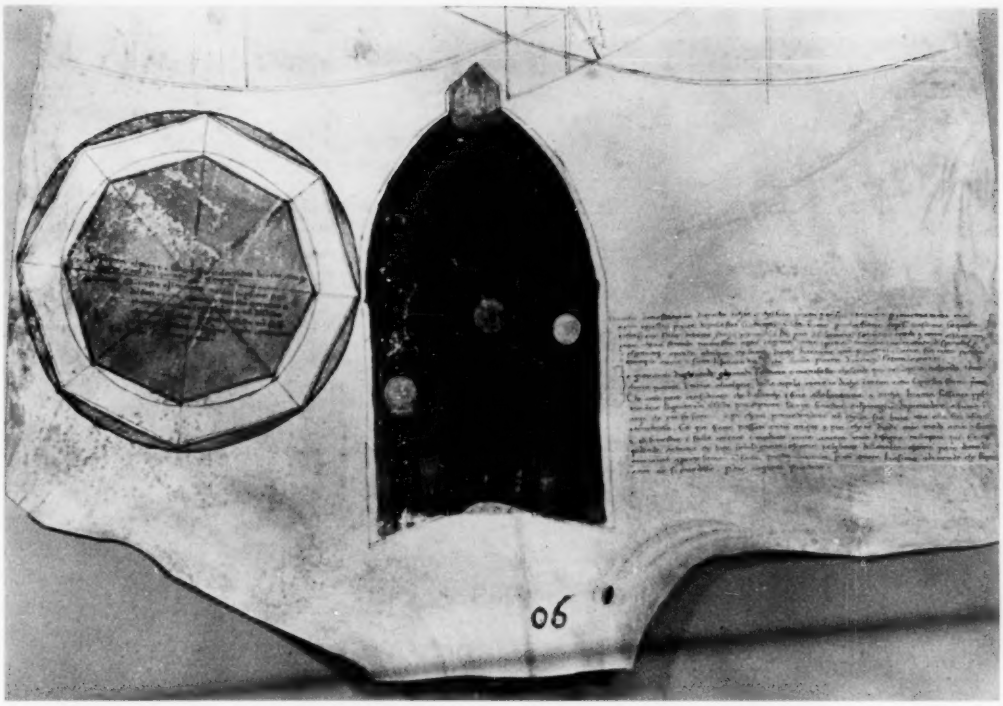
26. See n. 44.

27. Prager, 'Brunelleschi's Inventions', pp. 539 f. The document published by C. Frey, *Le vite di Filippo Brunelleschi* (Berlin, 1887), p. 155, referring to a payment of 10 soldi to Brunelleschi for bricks and Vasari's remarks (*Le vite*, ed. G. Milanesi [Florence, 1878–1885], II, 339) are hardly sufficient evidence for such a major change in a building program to which the architects were bound as late as 1421. Prager is vague as to whether the whole tambour idea is new or only some special technical aspect of its construction. The absolute silence of the documents speaks volumes here.

28. For a discussion of the formal organization of the *opera* as reflected in the Cathedral documents see the as yet unpublished dissertation of A. Grote, *Studien über die Geschichte der Opera der Santa Reparata zu Florenz im 14. Jahrhundert*, University of Munich (1958), *passim*.

29. Paatz, *Kirchen*, III, 721; Prager, 'Brunelleschi's Inventions', p. 532.

30. Guasti, *Cupola*, Doc. 70.



2. Detail of fig. 1. Section and plan of cupola.

had to be adhered to, but the specific nature of this adherence was subject to interpretation by the available experts. On the basis of such models, fundamental decisions were made concerning the feasibility of large-scale projects. The individual technical problems could, in fact, only be solved as they arose.[31]

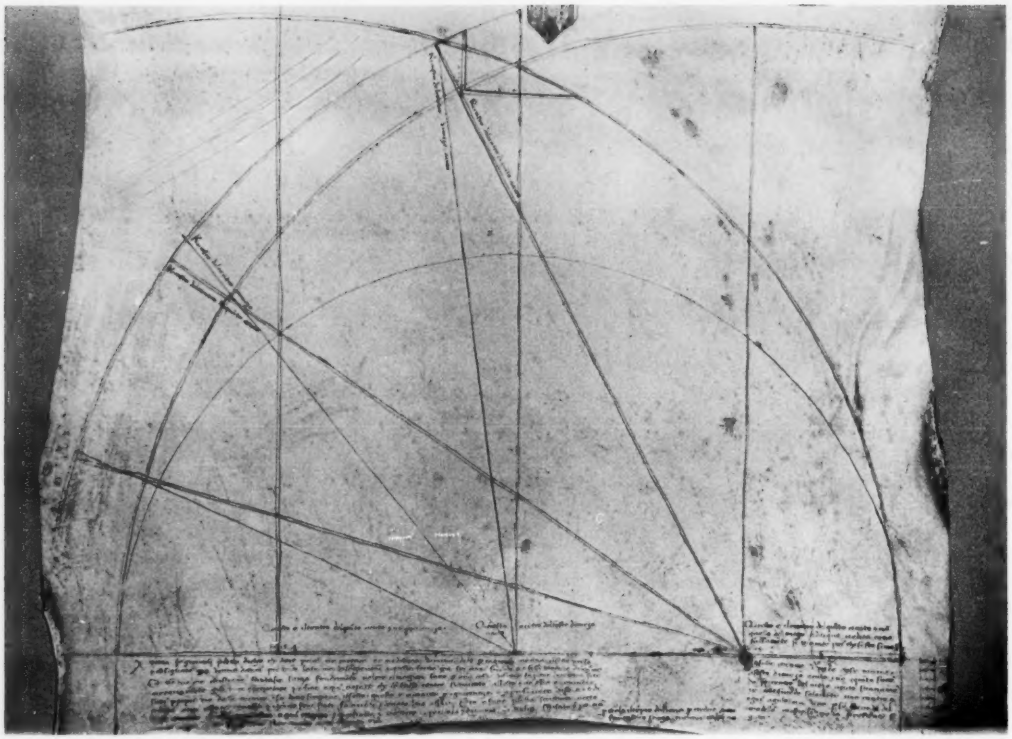
The second part of Giovanni's presentation, the geometrical construction of the cupola (fig. 3) has, perhaps, an even greater fascination. The base line of the figure is divided into five equal parts. The number written next to two of the dividing points informs us that each part equals 15⅖ braccia, making a total of 77 braccia. This total corresponds to the best available measurements of the inner diameter of the cupola, angle to angle, not side to side.[32]

31. On the character and function of models and drawings in late mediaeval practice, see H. Saalman, 'Early Renaissance Architectural Theory and Practice in Antonio Filarete's *Trattato di Architettura*, Excursus. Drawing, Model and Perspective in Fourteenth and Fifteenth Century Architectural Practice', *Art Bulletin* XLI (1959).

32. C. v. Stegmann and H. v. Geymuller, *Die Architektur der Renaissance in Toskana* (Munich, 1885–1893), IA, 42. See also *Rilievi e Studi sulla Cupola del Brunelleschi eseguiti dalla Commissione nominata il 12 Gennaio 1934* (Florence, 1939), pl. X; also P. Sanpaolesi, 'Il rilievo della Cupola del Duomo di Firenze', *Rivista d'Arte* XIX (1937), 79–83; and B. S. Sgrilli, *Descrizione e studi dell'insigne fabbrica di S. Maria del Fiore* (Florence, 1733), *passim*, based on the measured drawings of Senator Giovan-Battista Nelli, long-time curator of the Cathedral.

The extreme right-hand fifth is divided in half by a point marked '7⅖'. This was evidently a conveniently close approximation to one-half of 15⅖ or 77/10.[33] The left-hand inner curve is flanked by a second curve which converges towards the inner curve as it approaches the vertical center axis and is apparently meant to represent the outer shell of the cupola. Measurement reveals that at the base line the distance between the inner and the outer curve is a little less than one-half of one of the fifths and can be calculated as 6.8 braccia. The vertical distance between the two shells at the top is given as 6 braccia. The unmarked direct distance can be calculated as roughly 5.2 braccia. These dimensions are not Giovanni's own invention. Brunelleschi's program of 1420 contains the following indications: the inner vault shell is to be 3¾ braccia thick at the bottom and 2½ braccia at the top, diminishing 'piramidalmente'. The outer shell is to be 1¼ braccia at the bottom and ⅔ braccia at the top. The space between is to be 2 braccia at the bottom and 2⅓ braccia at the top. The total of the bottom measurements is 7 while the top measurements add up to 5½. Giovanni gives ⅕ less at the bottom and 3/10 less at the top. But if we consider his loose

33. For similar fractional approximations, see E. Panofsky, 'An Explanation of Stornaloco's Formula', postscript to P. Frankl, 'The Secret of the Medieval Masons', *Art Bulletin* XXVII, 1945, pp. 61 f.; also Saalman, 'Early Renaissance Architectural Theory'.



3. Detail of fig. 1. Geometric construction of cupola.

handling of fractions and the rather crude construction, it is apparent that his figure is a more or less accurate illustration of the Brunelleschi-Ghiberti specification of 1420.

A semicircle with a radius of one-half the base diameter is drawn around the center point of the base. This point bears the notation 'Questo e centro del sesto dimezo acuto'. The two arcs of the pointed arch have their centers in the respective points marking the outer fifth of the base. The center at the left bears the inscription 'Questo e ilcentro delquinto acuto e non quel dimezo'. As Nardini explained in his comments to Guasti's publication,[34] these terms represent late mediaeval usage for various arches. The two arcs of a 'quinto acuto' arch have radii equal to four-fifths of the base diameter of the arch with respective centers at the four-fifth points on either side of the base diameter. A round arch, or 'sesto di mezzo acuto', is nothing but a pointed arch in which both radial centers coincide at the center of the base diameter so that the distance from either springing point of the arch to the nearest radial center is one-half (mezzo) of the base.

Guasti and Nardini did not specifically mention the two measurements 6 braccia and 12 braccia at the top. The horizontal distance is the inner opening of the lantern which was finally fixed at 9⅔ braccia in 1433.[35] The vertical 6 braccia are the extent of the lantern wall closing off the upper end between the two shells.

Next to the right-hand 'fifth' point is the following text:

This is the center of the pointed fifth and not of the round arch. Thus, see how the rising vault over the cornice has been falsely built in that it has been built half round and not as a pointed fifth. By taking the center of the half round arch, the vault strangely has only one center while, according to the model, each angle has its own [center]. This is shown in the present figure.[36]

The rather redundant text is unclear in only one point, namely whether the word sequence 'secondo del modello mostrasi nella presente figura' should not be read as a continuous sentence; namely, 'according to the model shown in the present figure'. The somewhat wider than regular space left between 'modello' and 'mostrasi' supports my interpretation. The model under discussion would appear

34. See n. 2.

35. Guasti, *Cupola*, Doc. 251. Cf. also Docs. 247 and 248.

36. Questo e ilcentro delqui(n)to acuto (e) no(n) | quello del mezo adu(n)que uedete come | falsame(n)te se murato poi chesesto si mosse | i(n) sulla cornice i(n)pero chesemurato | asesto dimezo acuto (e) non a quinto, faccen | do centro del mezo acuto straname(n) | te uae face(n)do | solame(n)te uno centro (e) | ogni a(n)gulo na uno p(er) se secondo del | modello mostrasi nella presente fi | gura.

to be the model of 1420, since Giovanni's geometric construction emphasizes the double-shell system.

At the bottom, under the construction, there is a long explanatory note:

> Again, I, the aforesaid Giovanni, declare that it seems to me that the angle chosen (preso) and suggested decades ago, ought not to be changed or modified by lowering it for any reason whatever, thus giving it the form of San Giovanni. The form [of the cupola] was discussed (si delibero) six years ago and a wooden model was made. And we [ought] not to want the greater (ilmagiore) made according to strange fantasies without foundation and for such reasons (cosa disimile fazione) brazenly spoil and endanger the church. In regard to this, note that the vault has been built with a false center and not with its appropriate center, or better, centers, ever since the vault was begun over the cornice. This has happened because of ignorance and presumption on the part of those to whom [the execution] has been entrusted, and who are being well paid and compensated for it. And I have written this so that if that befalls which all reason tells me must befall, and [the building] is spoiled and put in danger of ruin, I shall be excused and blameless. For God's sake, be prudent, which I am certain you will be. [Think of] the danger [that befell] the temple of Siena for trusting a dreamer incapable of reasoning (sanza neuna ragione).[37]

This passage presents only one textual problem, namely the significance of 'ilmagiore'. On one hand, the vault should not be lowered in imitation of the form of San Giovanni. On the other hand, Giovanni urges that it ought not to be made 'greater'. The solution to this puzzle is not difficult. A check of the best existing elevations of the Baptistery reveals that the cupola of San Giovanni is, in fifteenth-century terminology, a 'sesto di quarto acuto'; that is, the radius of its arcs equals three-quarters of the base diameter.[38] While the height of the resulting arch is lower, the distance from the springing point of the arch to the nearest radial center, the dimension which gives the arch its name, is greater. Giovanni is, as usual, redundant, but not self-contradictory. His emphasis on the form of San Giovanni explains a point to the left of the right-hand 'centro del quinto acuto' to which Nardini did not refer either. This point is just halfway between the arc and the center of the base diameter and is obviously meant to illustrate the 'centro del *quarto* acuto'.

The figure alongside of the section view now comes into the discussion (fig. 4). It is directly related to the geometrical construction of the elevation of the cupola and cannot be entirely understood without it. It consists of two concentric circles divided into eight equal sections with octagons inscribed in the circles. While the circles seem to be extraneous to the problem and nothing more than geometrical aids in the construction of the octagons, the figure as a whole can be recognized as a plan of the cupola with the double-shell system indicated by the concentric octagons. The geometrical construction above it is in an approximately accurate scale relationship to the actual dimensions of the cupola, but this plan is out of proportion since the space between the shells is equal to a little over one-sixth of the diameter of the inner octagon. However, a scaled representation would hardly have made the point more clearly. In any event, Giovanni is not concerned with the dimensions or the double-shell system as such, but with the elementary problem of illustrating the practical difference between the 'sesto di mezzo acuto' and the 'sesto di quinto acuto'. An interpretive translation of the somewhat obscure text written into the octagon is as follows:

> Above in the middle. This is the center of the round arch and not of the pointed fifth.
>
> Below. This is the apex of the vault (centro nella superficie) and not the center of the pointed fifth. [That is to say] it is the [axial] center of the vault sections (centro agli anguli nella superficie), and not of the rising arcs of the vault (sesto che va in alto). [That is] unless the arcs are round (mezzo acuto). Thus, see how this thing is conducted and goes.[39]

In the first sentence 'above in the middle' refers to the geometrical construction literally above the plan and reiterates once more the fact that the center point of the base diameter is the center of the *mezzo acuto*. The indication 'below' brings us back to the plan itself which is evidently to be studied together with the elevation. He then repeats again that the center point is not the center of the pointed fifth, but this time with an interesting variation; namely, that the center point of the figure 'below' is literally the 'center in the surface' and 'center of the angles in the surface, not of the rising arc'. What Giovanni obviously means is that the center of the plan represents the apex of the converging arcs of the vault, even if the vault is *quinto acuto*. Since this point lies on the vertical center axis of the vault, it will coincide with the center of the *mezzo acuto* on

37. Ancora Io Giouan(n)i p(re)detto dicho che ame pare ne mutare ne modificare diminuendolo p(er) cagione neuna il sesto preso | (e) co(n)sigliato gia decine danni, pre(n)dendo laforma di sa(n)giouan(n)i. (e) questa forma gia sei anni si dilibero, (e) fessi modello dileg(n)ame | Et no(n) uolere co(n) istrane fantasie sanza fondame(n)to, uolere ilmagiore fatto p(er) una cosa disimile fazione ditempio site | merariame(n)te guastare et pericolare (e) i(n)fino a qui, notate che co(n) falso centro semurato al sesto (e) no(n) (con) suo o uerame(n)te | suoi propri cie dalla cornice i(n) su doue si muoue ilsesto. questo e auenuto p(er) ignioranza (e) p(er) presumere dise cio e di | coloro acui estata comessa (e) chenne sono stati salariati (e) donato loro assai. Et io o fatto questa scrittura accio | chese auiene quello mimostra ogni ragi(o)ne i(n) guastalla (e) mettere apericolo diruinio io nesia scusato in(per)o no(n) | ciarei colpa p(er)dio sate saui chemirendo certo sarete.

p(er)icolo ilte(m)pio disiena p(er) credere auno | fantastico sanza neuna ragione.

38. Sgrilli, *Descrizione*, fig. XVII.

39. disopra al mezo. Questo eilcentro disesto amezo | acuto (e) no(n) delquinto acuto.

disotto Questo ellcentro nella sup(er)ficie (e) no(n) | del ~~sest~~ cu(n)to acuto (e) questo ecentro a | glia(n)guli nella sup(er)ficie (e) no(n) disesto | che uua i(n) alto. segia il sesto no(n) fosse | a mezo acuto. adu(n)que uedi comella | cosa si(con)duce (e) ua.

the base diameter below, but not with the two centers of the *quinto acuto*.

It thus appears that Giovanni's figure is more than a plan, rather a plan and bird's-eye view in one. In this respect it has a close and significant relationship to both the much studied Northern tower plans and to the Brunelleschi-Filarete plans I discuss elsewhere, which also contain, as it were, their own elevations.[40] Also unorthodox, but nonetheless effective, is the use of color, which serves to emphasize the double-shell system of the cupola.

Let us turn back to Giovanni's arguments, which are, after all, the reason for the drawings themselves. While he may or may not have a point regarding the illumination of the cupola, it is difficult to believe his second argument. Brunelleschi surely not only knew the difference between a *quinto acuto* and a *mezzo acuto* but also how to execute a vault accordingly. The lines in Giovanni's construction marked 'ricasco del centro di quinto acuto' (curvature of the pointed fifth) are, in fact, a graphic demonstration of the 'gualandrino con tre corde' mentioned in Brunelleschi's report of 24 January 1426 to the *operai* of Santa Maria del Fiore.[41] This *gualandrino*, discussed and partly reconstructed by Prager,[42] consisted of a rope or cane attached to the cornice at the foot of the cupola, projecting outwards from any of the angles to the *centro del quinto acuto*, or nearly nine meters, and firmly fixed above and below so as to be immovable. At the center of the pointed fifth there must have been an iron ring and attached to this ring, freely movable, a wire or rope which functioned as the radius of the arc with a length of three-quarters of the base diameter. This wire or rope served to guide the bricklayers working on free-hanging centerings around the rims of the rising vaults. Making frequent geometric checks at all of the angles with the *gualandrino*, they moved gradually upwards, executing a perfect *quinto acuto*.

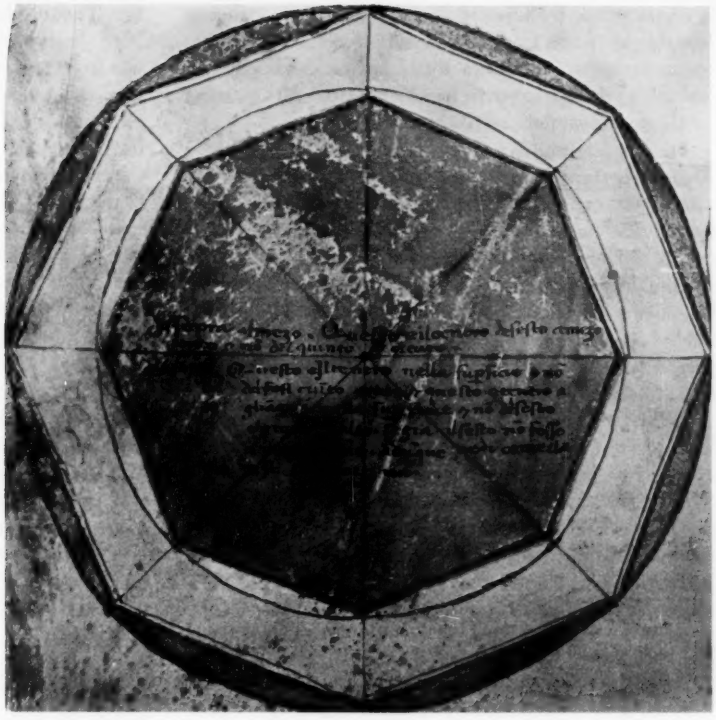
It is hard to imagine that Brunelleschi and Ghiberti had not used some sort of geometrical control system like this from the very beginning, or that any pointed arch or vault, whether built with a fixed centering or not, had ever been constructed without some aid of this kind. It also seems beyond belief that Brunelleschi should have been unaware of the fact that every angle of the rising vault would have its own center. It is even probable that more than one section was under construction at one time and that a number of these devices were used simultaneously. It is, finally, almost impossible to believe that Brunelleschi and his assistants, who are obviously under accusation, would have begun building the *quinto acuto* vault as a *mezzo acuto*. Nothing in the finished shells, which are almost perfectly *à quinto acuto*,[43] suggests that anything of this kind happened or that a correction was made after a wrong beginning.[44] Giovanni's argument seems to be the result of personal jealousy on the part of a probably little consulted substitute. This was the opinion of Guasti and Nardini.

However, the actual events may have been somewhat more complicated. Giovanni was always named with respect in the documents and if, as seems likely, our parchment is among those for which he was paid ten gold florins on 28 February 1426, then his compensation was rather considerable. There is the further circumstance that in a vault of the proportions of the *cupolone* of Santa Maria del Fiore, the difference between the curvature of a *quinto acuto* and a *mezzo acuto* becomes clearly noticeable only at some height, as also appears from Giovanni's somewhat crude construction. It is possible that Brunelleschi began the lower part of the vault without the fixed *gualandrino* (which, moreover, is not specifically mentioned in the 1420 program), and simply made an occasional check with a provisional mechanism.

This brings up the question of just how far along the cupola actually was at the beginning of 1426. In November 1422 the building material was changed from stone to brick.[45] According to the building program as modified in March 1422,[46] the twelve-braccia point must then have been reached. The period July 1423 to April 1424 was taken up with study of the chain problem. Brunelleschi's system triumphed while Giovanni di Gherardo also submitted a model for which he was paid two gold florins.[47] The second set of chains was begun in June 1425.[48] It has thus far not been demonstrated just where these chains might actually be and it has been suggested that they may not have been built at all.[49] I shall present evidence in

40. Saalman, 'Early Renaissance Architectural Theory'.
41. Guasti, *Cupola*, Doc. 75.
42. Prager, 'Brunelleschi's Inventions', pp. 481 and 500 f., fig. 9.
43. *Rilievi e Studi sulla Cupola*, *passim*.

44. H. Siebenhüner, 'Brunellesco und die Florentiner Domkuppel', *Mitteil. d. Kunsthist. Inst. Florenz* VI (1940), 434 (cf. Paatz, *Kirchen*, III, 333, 459 f.) and P. Sanpaolesi, *La cupola di Santa Maria del Fiore*, *passim*, have come forward to support Giovanni's idea suggesting that Brunelleschi, in spite of his written program specifying the *quinto acuto* curvature for the cupola, really began work with a different curvature. Siebenhüner hints at a change of plans and suggests that already the program of 1420 represented an alteration of the model of 1367. Sanpaolesi believes that Brunelleschi began the cupola *à mezzo tondo* and that he must have had a preference for this form, presumably because it is less 'Gothic'. He sees Giovanni's document as confirmation of this theory, which he finds further supported in the angle of the bricks in the lower part of the cupola. According to Sanpaolesi, the lower bricks converge on one center while the bricks in the upper parts do not. Neither of these authors refer to the fact that the architects were sworn to adherence to the 1367 model as late as 1421. Both are vague about whether or just how the 1420 model was in conflict with the written *quinto acuto* program of 1420, or whether the 1367 model itself might have had a *mezzo tondo* cupola, an idea contradicted in the first line by Giovanni's own testimony.
45. Guasti, *Cupola*, Doc. 241.
46. Guasti, *Cupola*, Doc. 52.
47. Guasti, *Cupola*, Docs. 178, 179, 181.
48. Guasti, *Cupola*, Doc. 242.
49. See n. 1.



4. Detail of fig. 1. Plan of cupola.

further studies to support my view that the stone chains were actually built and that when Giovanni presented his arguments sometime late in 1425, the second chain was being laid at a point just under the middle walk between the two shells of the cupola, that is, at a little less than one-third the total height of the vault. At the height reached in 1425 Giovanni may actually have believed that the vault was being built *à mezzo acuto*, or at least thought that he could convince the *operai* that this was being done. His tone leaves no doubt as to his personal attitude towards those who 'were being well paid' for building the cupola. Brunelleschi and his co-workers, under pressure to justify themselves, then drafted the report of 24 January 1426, in which they present a more detailed description of their plans and methods, including the *gualandrino*, and reject Giovanni's suggestions about the windows, at least for the time being. This report was accepted by the *operai* and with that the matter seems to have been closed. It may be no coincidence that, after being paid for his advice three weeks later, Giovanni's name disappears from the Cathedral documents.

Another aspect of the parchment remains to be discussed. Nothing in Giovanni's drawings demonstrates his argument that the vault was being built *à mezzo acuto* and it is a question whether he could have proved this point with an illustration. The main purpose of the construction seems to be to illustrate the difference between a *mezzo acuto* and a *quinto acuto*. Various parts of the design not specifically mentioned in the text, such as the *centro del quarto acuto*, and the measurements around the lantern opening suggest that Giovanni amplified his written remarks with extended verbal explanations after having clarified the basic geometrical aspects of the problem. While the lines leading from the *centro del quinto acuto* appear to demonstrate the proper method for controlling the curvature of the vault, it remains unclear just what he meant to illustrate with the lines leading from the center and marked 'ricasco del centro di mezzo acuto', especially since these lines extend to the outer shell and do not execute a 'curvature of a round arch' at all. They seem to be the reflection of an involved verbal explanation to the effect that the radii of a semicircle would naturally be equal and that thus they cannot serve in the building of a pointed arch since the distances from the *centro del mezzo acuto* to various points on the *quinto acuto* are always different.

To the right of the large geometrical construction is a curious symbol in the form of a ladder with eleven more or less equally spaced rungs. The term *scala* comes immedi-

ately to mind. However, this scale has a relationship of roughly 1 : 1.1 to 1.2. with the marked dimensions in the construction and gives no significant measurements for the other two figures on the parchment either. Its meaning or purpose must remain unexplained.

Finally, Giovanni's construction has another strange aspect. He demonstrates the two shells and the space between them by nothing more than two more or less parallel lines, which stand, as we have already mentioned, for the width of the two shells and the space between them. Since the building program and, presumably, the model of 1420 specified a pyramidal reduction of the thickness of the shells towards the top, Giovanni's peculiar method of illustration with lines leaves him no choice but to have the two theoretically parallel shells converge towards the apex. This convergence could not be constructed geometrically and Giovanni went over his still faintly visible silverpoint construction with freehand brown and red ink lines.

This last peculiarity points up a strange circumstance already inherent in Brunelleschi's program of 1420. The base dimensions are 3¾ braccia for the inner shell, a 2 braccia space and a 1¼ braccia outer shell. The shells diminish to 2½ braccia and ⅔ braccia respectively at the top. The thickness of the shells, however, could only have been diminished from the outside since the inner curve was to be regulated by the *gualandrino*.[50] This being the case, the reduction of the outer shell would have no effect on the space between the two shells but the reduction of the inner shell on its respective outer side would increase the space between the shells by 1¼ braccia. Since it was 2 at the base it should be 3¼ at the top. Yet Brunelleschi specifies that the space at the top shall be 2⅓ braccia or only ⅓ more than at the base.

It might be suggested that Brunelleschi intended to deviate slightly from the true and controllable *quinto acuto* for the sake of keeping the space between the shells close to 2 braccia. Just why or how he might have done this is unclear. On the other hand, the discrepancy may be due either to a miscalculation by Brunelleschi himself or to a faulty transcription of the text of his 1420 specification, which is repeated in all existing copies. This minor mystery may ultimately prove insolvable with the facts at our disposal. It can only heighten our humility before the towering achievement this late mediaeval structure represents, to realize that, in the last analysis, it keeps some of its secrets to itself.

50. This was actually done in building the cupola. Two 10–12 cm. set-backs can be observed on the outer side of the inner shell, one between first and second walks, another about five meters above the third walk.

New Madrid on the Mississippi

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In October 1788 a handbill appeared in New Jersey and other northeastern states describing a proposed city and colony on the western bank of the Mississippi in Spanish territory. Over the name of George Morgan, late colonel in the Revolutionary Army, the notice set out the following terms of settlement:

> All Farmers, Tradesmen, &c. of good Characters, who wish to unite in this Scheme, and to visit the Country under my Direction, shall be provided with Boats and Provisions for the Purpose, free of Expence, on signing an Agreement, which may be seen by applying to me at Prospect, near Princeton, on or before the 8th Day of October; or at Fort Pitt, by the 20th Day of November next. . . . Every Person who accompanies me in this Undertaking, shall be entitled to 320 Acres of Land, at one eighth of a Dollar per Acre . . . ; 640 Acres, or more, being first reserved for a Town, which I propose to divide into Lots of One Acre each, and give 600 of them, in Fee, to such Merchants, Tradesmen, &c. as may apply on the Spot, and 40 of them to such Public Uses as the Inhabitants shall, from Time to Time, recommend; together with one Out Lot of 10 Acres to each of the first 600 Families who shall build and settle in the Town.
>
> All Persons who settle with me at New-Madrid, and their Posterity, will have the free Navigation of the Mississippi, and a Market at New-Orleans, free from Duties, for all the Produce of their Lands, where they may receive Payment in Mexican Dollars for their Flour, Tobacco, &c.[1]

Morgan's colonization activities were to include one of the most interesting, and perhaps the most futile, episodes in American town planning. Certainly it represented one of the earliest attempts by citizens of the new nation to lay out a town for more than speculative or utilitarian purposes. That Americans sought to carry out this project in Spanish territory requires some explanation.

Since the end of the Revolution the feeble Continental Congress had been confronted with problems affecting the territory beyond the Allegheny Mountains to the Mississippi River. These problems centered on the conflict between the American and Spanish governments over rights of navigation on the Mississippi, trading privileges at New Orleans, and customs collected by the Spanish on goods shipped through that port by western farmers.

Spanish policy was aimed at blocking westward expansion of the new nation. Closing the Mississippi to trade was a furtherance of that policy. Spain evidently hoped that settlement would be discouraged if the easiest and cheapest route to markets was denied to farmers in the old Northwest Territory. Spain may also have hoped to profit from the discontent of Kentucky settlers over the ineffectiveness of American representations to the Spanish authorities on trade and navigation rights. If Kentucky could be induced to establish itself as an independent republic, or if the settlers could be lured to Louisiana by generous land grants, Spain's position would be immeasurably strengthened. Both possibilities were explored by Don Esteban Miro, Governor of Louisiana, whose favors were courted by James Wilkinson, one of the leaders of the Kentucky Separatists.

In the east the Spanish Minister, Don Diego de Gardoqui, received instructions from his government to promote development of the Louisiana Territory through the extension of land grants to prospective colonists. It was at this time that George Morgan was attempting to negotiate a western land purchase with the Board of Treasury on behalf of the New Jersey Land Society, of which he was one of the leading figures. Morgan had previously been associated with other similar land companies, none of which had been successful in acquiring title to western lands.

When Morgan learned of the Spanish policy he quickly shifted his attention from the Treasury to Gardoqui. Morgan submitted a number of proposals for colonization to Gardoqui. The proposed colony was to consist of a large area of land extending westward from the Mississippi and north and south from a point opposite the mouth of the Ohio. Morgan was to be given command of the colony, freedom of religion was to be established, the colonists were to be permitted self-government although subject to the King, and the town to be established was to be a port of entry for the control of trade.[2] Morgan was to be paid for his services and was to receive a land grant of at least one thousand acres for each of his five children, himself, and his wife. Gardoqui was so impressed by Morgan's reputation and his evident understanding of how to organize such a venture that he was quick to agree to the proposal.

1. From a reproduction of Morgan's handbill in Max Savelle, *George Morgan, Colony Builder* (New York, 1932), following p. 206.

2. See Savelle, *Morgan*, pp. 201–205 for a more detailed treatment of the negotiations between Morgan and Gardoqui.

Morgan was eager to begin. Instead of waiting for Gardoqui to receive approval of the scheme from Spain, he requested and was granted permission to visit the area immediately, lay out the city, and make provisional land grants and sales subject to later affirmation by the King. Gardoqui wrote to Miro informing the Louisiana Governor of his action:

> I enclose in this a duplicate of that which I had the satisfaction of writing to Your Lordship introducing to your protection Colonel Don Jorge Morgan. The latter laid before me after a few conferences a certain project for the formation of a new settlement on our western bank of the Misisipy river, south of Cape Cinque Hommes. It seems to me to be for the most part in accordance with the orders of the King. I regarded it as admissible, provided it were approved by His Majesty....
>
> Contemplating this acquisition as one of the most important in the service of the King, I conducted myself in terms which I believe will have effect; and having proposed to me that he desired to take advantage of the rainy season to explore the land and fix on the place for settlement, I thought it best to grant it and contribute to his expenses, for I was certain that the end merits it and that his Majesty will approve it.[3]

It was on this authority that Morgan issued the handbill quoted at the beginning of this article. It attracted a number of persons willing to emigrate, and in January 1789 Morgan and some seventy companions started down the Ohio River from Fort Pitt.[4]

The party reached the Mississippi on 14 February. After investigating possible sites for the colony they finally settled on a location about forty miles south of the mouth of the Ohio. Morgan had previously decided to call the town New Madrid out of respect for his sponsors. The town site was described in a letter from several settlers sent to friends in Pittsburgh early in April. It was situated, they said,

> ... at a place formerly called Lance La Graise, or the Greasy Bend, below the mouth of a river, marked in Captain Hutchin's map Cheyousea or Sound river.
>
> Here the banks of the Mississippi, for a considerable length, are high, dry, and pleasant, and the soil westward to the river St. Francois, is of the most desirable quality for Indian corn, tobacco, flax, cotton, hemp, and indigo, though thought by some too rich for wheat; insomuch, that we verily believe that there is not an acre of it uncultivable, or even indifferent land, within a thousand square miles.
>
> The country rises gradually from the Mississippi into fine, dry, pleasant and healthful grounds, superior, we believe, in beauty and in quality, to every other part of America.[5]

1. Plan of the fort of New Madrid or Anse a la Graisse (from Collot, *Journey in North America*).

The location of the town and the surrounding country are shown in the plan (fig. 1) drawn by Victor Collot following his visit in 1796.[6] The swamps and marshes indicated on this map were conveniently overlooked by the first settlers in their description of the site. And, as we shall see, there were other features of the area that made it something less than an ideal location for a town.

Morgan had prepared detailed directions for the planning of the town. Probably he incorporated some of the features he had previously considered for town development during the many years he had endeavored to secure land grants elsewhere before and after the war. Some of these ideas he had summarized in the handbill already mentioned, and others were described in the settlers' letter of 14 April. Morgan's town planning ideas were set

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3. Gardoqui to Miro, 4 October 1788, in Louis Houck, *The Spanish Régime in Missouri* (Chicago, 1910), I, 284.

4. Morgan's expedition caused some concern in the new government of the United States. On 26 March 1789 James Madison wrote to George Washington, enclosing a copy of the Morgan handbill and noting, 'It is the most authentic & precise evidence of the Spanish project that has come to my knowledge.' *The Writings of James Madison*, ed. Gaillard Hunt (New York, 1900–1910), V, 331.

5. Letter to Messrs. Bedford and Turnbull from settlers at New-Madrid, 14 April 1789. There were apparently several versions of this letter printed in eastern newspapers in an attempt to attract additional settlers. The version quoted appeared in the *Virginia Gazette and Weekly Advertiser* of 27 August 1789 and was reprinted in the *Mississippi Valley Historical Review* V (December 1918), 343–346, with a brief explanatory note by E. G. Swem. A slightly different version is in Houck, *Spanish Régime*, I, 279–283.

6. Victor Collot, *A Journey in North America, Atlas* (Florence, 1924), pl. 30. Collot's two-volume description of the Ohio and Mississippi valleys and the accompanying atlas were prepared after his travels in 1796. The work was first published in French and English in Paris in 1826.

forth in detail in a document of his handwriting endorsed, 'General Directions for Settlement at New Madrid', dated 6 April 1789. It is evident that Morgan was thinking of something more elaborate than merely another river hamlet. He envisaged nothing less than New Madrid as the future metropolis of the central Mississippi Valley, and his town planning concepts matched this optimistic expectation.

Morgan first repeated the terms of land grants and sales to the original and subsequent settlers, much as they appeared in the handbill. However, the size of city lots to be granted to each of the first 600 settlers was reduced from one acre to one-half an acre, and the out lots from ten to five acres.

Morgan specified a rectangular street pattern and rectangular lot layout:

> In laying out the city, all streets shall be at right angles and four rods wide, including the foot-paths on each side, which shall be fifteen feet wide, and shall be raised twelve or fifteen inches above the wagon road. No person shall be allowed to encroach on the foot-paths, with either porch, cellar door, or other obstruction to passengers.
>
> All the oblongs, or squares of the city, shall be of the same dimensions, if possible; viz.: extending from east to west eighty rods or perches, and from north to south twelve perches, so that each oblong or square will contain six acres, which shall be sub-divided by meridian lines, into twelve lots of half an acre each. . . . The lots shall be numbered from No. 1 upward, on each side of every street; extending from east to west; commencing at the east end.[7]

Street names were to be simplified by reference to compass directions from King Street, the main east-west street, and River Street, the street running north-south along the Mississippi:

> The streets shall be distinguished by names in the following manner: the middle street shall be a continuation of the middle range or road, extending from the first meridional line to the Mississippi river, and shall be called King street; and the streets north of this, extending from east to west, shall be called first North street, second North street, and so on, reckoning from King's street or middle street. In like manner all the streets south of Kings street or middle street. . . ; so also, all the streets extending North and South shall be distinguished by the names of first River street, second River street, and so on; reckoning the space between the eastmost squares and the river, as first or front River street.[8]

Although Morgan's directions do not mention one deviation from the gridiron plan, the settlers' letter written eight days later indicates that this was contemplated. The letter describes a lake within the boundary of the town, '. . . of the purest spring water, 100 yards wide, and several leagues in length north and south, and emptying itself by a constant narrow stream through the center of the city. . . .

'On each side of this delightful lake, streets are to be laid out 100 feet wide, and a road to be continued round it of the same breadth, and the trees are directed to be preserved for ever, for the health and pleasure of its citizens.'[9]

Morgan was generous in setting aside open spaces and sites for public uses and religious and educational purposes. 'Forty lots of half an acre each shall be reserved for public uses, and shall be applied to such purposes as the citizens shall from time to time recommend, or the chief magistrate appoint; taking care that the same be so distributed in the different parts of the city that their uses may be general, and as equal as possible.'[10]

The two lots on either side of King Street nearest the river were to be dedicated for market places. Lot 13 on the south side of King Street was reserved for a Catholic school and Lot 13 on the north side for a Catholic church. Similarly the two lots numbered 13 on the north and south side of every fifth street above and below King Street were to be reserved for a church and school.

In addition to these forty sites, Morgan directed that two large parks also be provided: 'There shall be two lots of twelve acres each laid out and reserved forever; viz.: one for the King, and one for public walks, to be ornamented, improved and regulated by or under the direction of the chief magistrate of the city, for the time being, for the use and amusement of the citizens and strangers.'[11] And along the Mississippi, 'The space between the eastmost squares and the river, shall not be less than one hundred feet at any place, from the present margin or bank of the river, to be kept open forever for the security, pleasure and health of the city, and its inhabitants; wherefore religious care shall be taken to preserve all the timber growing thereon.'[12] This reference to the preservation of trees obviously reflected a special concern of Morgan's, for he also specified that on the forty reserved lots and the two large parks, '. . . the timber, trees and shrubs, now growing thereon, shall be religiously preserved as sacred; and no part thereof shall be violated or cut down, but by the personal direction and inspection of the chief magistrate for the time being, whose reputation must be answerable for an honorable and generous discharge of this trust, meant to promote the health and pleasure of the citizens.'[13] There was a similar injunction against removal of trees in any city street or country road without approval of the 'magistrates of the police, or an officer of their appointment'.

Finally, Morgan specified that in the farm area surrounding the town certain sites were to be dedicated for public uses:

7. George Morgan, 'General Directions for Settlement at New Madrid', in Houck, *Spanish Régime*, I, 303.
8. Houck, *Spanish Régime*, I, 303–304.
9. Letter to Messrs. Bedford and Turnbull, 14 April 1789, in *Mississippi Valley Historical Review* V (December 1918), 343–346.
10. Houck, *Spanish Régime*, I, 302.
11. Houck, *Spanish Régime*, I, 302–303.
12. Houck, *Spanish Régime*, I, 304.
13. Houck, *Spanish Régime*, I, 303.

There shall be a reserve of one acre at each angle of every intersection of public roads or highways, throughout the whole territory, according to the plan laid down for settlement of the country; by which means, no farm house can be more than two miles and a half from one of these reserves, which are made forever for the following uses, viz.: one acre on the north east angle for the use of a school; one acre on the northwest angle for a church; one acre on the southwest angle for the use of the poor of the district, and the remaining angle in the south east angle for the use of the King.[14]

The original town plan has apparently not survived, and the earliest known map (fig. 2) dates from 1794, by which time many changes had been made in Morgan's scheme.[15] There are obvious changes in street names, lot layout and numbers, reserved open spaces and public building sites, and the addition of Fort Celeste in the center of the town. Morgan's ideal city and proposed western metropolis had developed as a conventional and rather dreary frontier village.

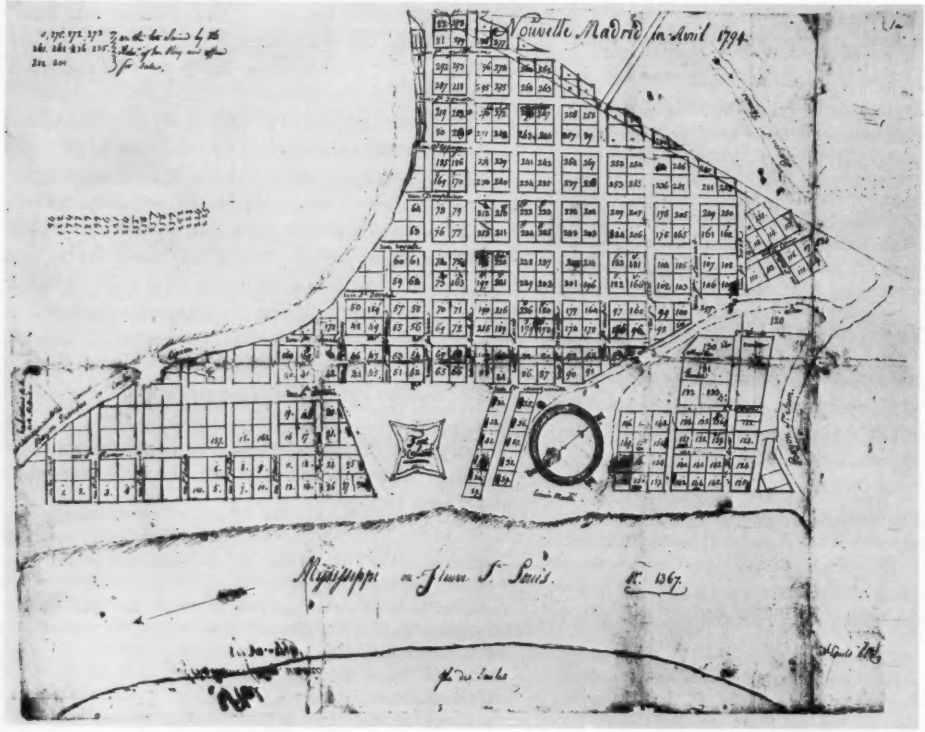
What had occurred may be briefly summarized. After Morgan had laid out the town and made provisional land grants and sales to the first settlers, he set off to New Orleans to inform Miro of his progress. To his consternation and anger Morgan discovered that Miro, far from pleased with his action, disapproved of the terms of settlement and maintained that Gardoqui had exceeded his authority in making the conditional grant of land for the new colony. Miro's chief stated objection was that settlers should be given free land and that no individual like Morgan should be the recipient of large tracts to be laid out and sold for personal aggrandizement. Moreover, Miro felt that Morgan had been presumptuous in naming his settlement after Madrid. He also disagreed with the principle of religious toleration specified by Morgan and agreed to by Gardoqui.[16] Miro, acting on the advice of Wilkinson, whose own plans for power and influence with the Spanish would have been upset by the Morgan scheme, refused to do more than confirm the titles already provisionally granted by Morgan and to recommend that he be given one thousand acres for himself and his sons. On Morgan's return to the east he reported his activities to Gardoqui, but after the death of his brother late in 1789 he appears to have lost all interest in the New Madrid colony.[17]

14. Houck, *Spanish Régime*, I, 303.

15. The author and source of this map are unknown. The original is in the New Madrid Archives of the Missouri Historical Society.

16. Miro's position was stated in a letter to Don Antonio Valdes, Secretary for the Indies, dated 20 May 1789. This was written before Morgan visited New Orleans. The letter is given in Houck, *Spanish Régime*, I, 277–278.

17. Morgan wrote Gardoqui from his home at Prospect, N. J., on



2. Plan of New Madrid, April 1794 (courtesy of Missouri Historical Society).

New Madrid continued to attract settlers. The Spanish commander of the town could report that in the first four months of 1791 nearly two hundred new persons had taken up residence.[18] By the end of 1797 the total population was 569, plus 46 slaves; an increase of 116 over the previous year.[19] When Francis Baily visited the town in April 1797 he found '. . . two or three hundred houses, scattered about at unequal distances within a mile of the fort, which stands in the centre of a square in the middle of the town, and which contains from thirty to forty men. Great encouragement is held out by the Spanish government to persons settling here; there being given to them from two hundred and forty to four hundred acres of land gratis. . . .'[20]

But as Baily and practically all other visitors observed, the future of the town was threatened by the eroding effects of the Mississippi. Collot described this danger which he witnessed on his visit in 1796:

> The river . . . caries away, at different periods of the year, a considerable quantity of the ground on which the town and fort are built; this ground being composed of earth, washed down by the waters, is easily dissolved, and extends twelve miles inland, without changing either its nature or its level. Nothing can hinder this destructive effect. . . . Every annual revolution carries off from one to two hundred yards of this bank; so that the fort, built five years since at six hundred yards from the side of the river, has already lost all its covered way; and at the time we passed, the commander had given orders to empty the magazines and dislodge the artillery, having no doubt but that in the course of the winter the rest of the fort would be destroyed.[21]

By 1810 a considerable portion of the original town had vanished into the river, as is shown by a map made in that year (fig. 3). The fort, two tiers of blocks and a portion of a third, and two streets paralleling the Mississippi had all disappeared. This gradual destruction would probably have eliminated all remaining traces of Morgan's plan in time, but in 1811 a still greater disaster occurred. In December of that year a violent earthquake shook the entire region, and the center of its force was at or near New

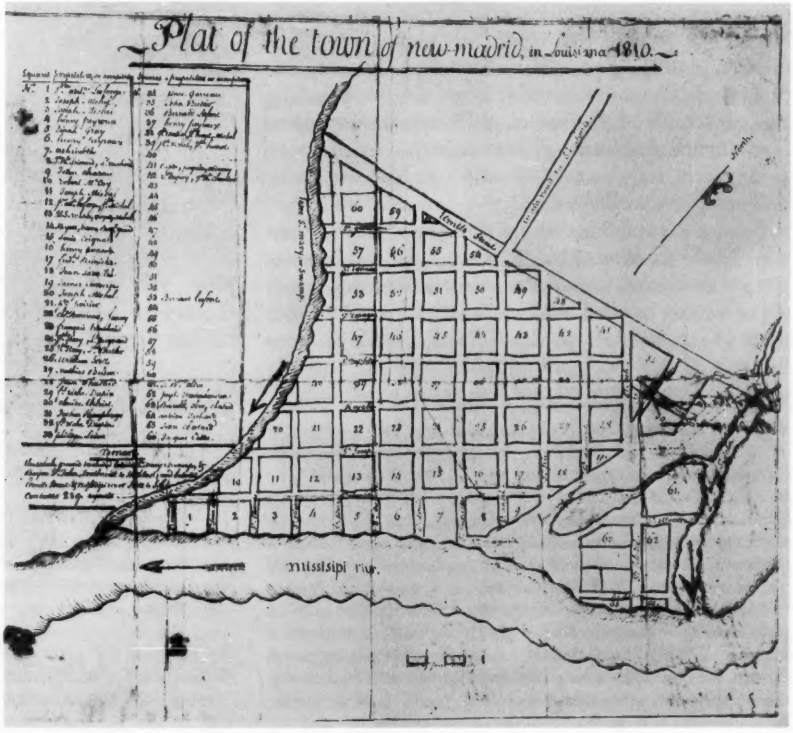
20 August 1789. This long letter contains a full account of his negotiations with Miro, his comments on colonization policy, and a claim of compensation for his efforts. The entire letter is in Houck, *Spanish Régime*, I, 286–299. According to Savelle, Morgan also prepared an eight-page pamphlet on the New Madrid colony published shortly after his arrival in Philadelphia on 28 July. This was evidently his last effort to promote further emigration. Savelle, *Morgan*, p. 224.

18. Letter from Pedro Foucher to Miro, 26 April 1791. Houck, *Spanish Régime*, I, 327–329.

19. Census of New Madrid, 1797. Houck, *Spanish Régime*, II, 397.

20. Francis Baily, *Journal of a Tour in Unsettled Parts of North America in 1796 & 1797* (London, 1856), p. 262.

21. Collot, *Journey*, II, 17–18.



3. Plan of New Madrid, 1810 (courtesy of Missouri Historical Society).

Madrid. Here is the description of its results by the Rev. Timothy Flint who lived in the town for several months a few years after the tragedy:

> . . . Whole tracts were plunged into the bed of the river. The graveyard at New Madrid, with all its sleeping tenants, was precipitated into the bend of the stream. Most of the houses were thrown down. Large lakes of twenty miles in extent were made in an hour. Other lakes were drained. . . . The trees split in the midst, lashed one with another, and are still visible over great tracts of country, inclining in every direction and in every angle to the earth and the horizon. They described the undulation of the earth as resembling waves, increasing in elevation as they advanced, and when they had attained a certain fearful height, the earth would burst, and vast volumes of water, and sand, and pit-coal were discharged, as high as the tops of the trees. . . .
>
> After the earthquake had moderated in violence, the country exhibited a melancholy aspect of chasms of sand covering the earth, of trees thrown down, or lying at an angle of forty-five degrees, or split in the middle. The earthquakes still recurred at short intervals, so that the people had no confidence to rebuild good houses, or chimnies of brick. . . . New Madrid again dwindled to insignificance and decay; the people trembling in their miserable hovels at the distance and melancholy rumbling of the approaching shocks.[22]

The ravages of erosion and the destruction caused by the earthquakes put an end to any remaining hope that Morgan's original concept of a beautiful and thriving town might survive. A brief period of activity occurred when Congress, in an effort to relieve the earthquake's victims, enacted a provision granting owners of New Madrid land the right to select tracts elsewhere in Missouri. Speculators promptly took advantage of this by purchasing worthless land in New Madrid, often from owners ignorant of this Congressional generosity, solely to acquire cheap title to land of their own selection. The confusion resulting from this law and its conflicting interpretations was to plague title searchers for generations. The benefits, such as they were, were realized by only a few of those whom the law was designed to aid.

Despite the condition of the town, its reputation had been firmly established by the promotional literature of Morgan and his associates. Almost all travelers in this part of the country stopped at New Madrid, no doubt curious to see what portion of Morgan's elaborate scheme had been carried out. Without exception they were outspoken in their disappointment or ridicule. The following description appeared in *The Western Gazetteer:* '*New-Madrid* is situated on a rich plain near the river bank, about seventy miles below the Ohio. This place has been finely described, and appears to better advantage on paper, than when under a *coup d'oeil.*'[23] And in the similar work, *The Emigrant's Guide*, which was published the following year, the town was also mentioned: '*New Madrid* has received a celebrity that must astonish those who ever visited the place in open day. The ground . . . is exposed to the ravages of . . . [the Mississippi] . . . to whose force it has, to a great measure, yielded. The town is environed, both above and below, with stagnant muddy creeks.'[24]

4. New Madrid about 1857 (from H. Lewis, *Das Illustrirte Mississippthal*).

By the middle of the century practically all traces of Morgan's proposed metropolis had vanished. No features of the original plan have survived to the present time. An old print shows a view of the town as it existed one hundred years ago (fig. 4). A sleepy Mississippi River village then, and scarcely more than that today, New Madrid bears little resemblance to the generous vision of its now all-but-forgotten founder, George Morgan.

22. Timothy Flint, *Recollections of the Last Ten Years* (Boston, 1826), pp. 222–227. There is also a vivid contemporary account of the earthquake in John Bradbury, *Travels in the Interior of America* (Liverpool, 1817), pp. 199–207. See also Francis A. Sampson, 'The New Madrid and Other Earthquakes in Missouri', *Mississippi Valley Historical Society, Proceedings* (1912–1913), 218–238. Flint also records a more ludicrous visitation on the town. This was a band of religious fanatics who rarely washed or changed their clothes, and who descended on New Madrid by boat. '. . . They walked ashore in Indian file, the old men in front, then the women, and the children in the rear. They chanted a kind of tune, as they walked, the burden of which was "Praise God! Praise God!" . . . Sensible people assured me that the coming of a band of these Pilgrims into their houses affected them with a thrill of alarm which they could hardly express.' Flint, *Recollections*, p. 277.

23. S. R. Brown, *The Western Gazetteer, or Emigrants Directory* (Auburn, 1817), p. 206.

24. William Darby, *The Emigrant's Guide* (New York, 1818), p. 141. Earlier Collot had commented: 'Several newspapers have given magnificent descriptions of New Madrid: the people of this colony are naturally lavish in their praises of the spot they inhabit; and they even pretend to be more industrious, and their condition less miserable than that of the colonists in the Illinois. They are, perhaps, in the right; a tarnished coat is better than rags.' Collot, *Journey*, II, p. 19n. A later French visitor wrote: 'New Madrid, when seen on the map with such a fine name written in capital letters, might be taken for a large city; in reality it is but a vast, open terrain, on which the houses seem to flee from one another. . . .' Edouard de Montule, *Travels in America, 1816–1817* (Bloomington, 1951), p. 113.

Zoomorphic Shrines in Egypt and India

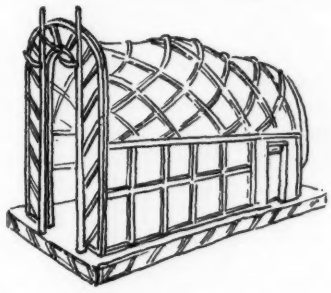
ALEXANDER BADAWY University of Kansas

It needs no emphasis that symbolism played a predominant rôle in the religious and funerary architecture of all peoples in antiquity, and still does today. However, symbolic elements of architecture belong to an advanced stage in the development of representation. A much more primary stage is the one where the actual deity is represented architecturally as a structure formed according to his shape. This shape could be conceptual to suggest cosmic elements; for instance, the world itself as in the stupa of India, and the stretch of the horizon where the sun rises between two mountains as in the pylon of Egypt. It could also be simply realistic when it imitates the shape of an animal by which a deity is represented. Such a zoomorphic architecture may be exemplified in the so-called shrine of Anubis in Egypt.

Drawings from the Archaic Period in Egypt (2800 B.C.) represent an edicule, probably religious or funerary, characterized by an irregular upper outline (figs. 1,2,3). Structurally it can be described as having an irregular vault with

1,2,3. Egyptian labels of the so-called Anubis hut, First dynasty, *c.* 2800 B.C. (from Badawy, *Dessin Architectural*).

a high arched doorway on the façade and springing from a lower vertical wall set on a shallow platform (fig. 4). The plan is rectangular, and the possibility of its having an apsidal end is not to be excluded. The style of the representations and their date suggest that light materials such as reeds were used for the frame, and wickerwork for the walls. The structure unmistakably resembles that of a crouching animal, even to the pendent tail. I have presumed, on the grounds of a comparative study with early religious texts, that it could represent Anubis, the god of the dead, in the shape of a jackal crouching on a base,[1] while an elephant has been suggested by others.[2] The type does not seem ever to have been translated into stone architecture. The ideological concept is that of the embodiment of a god into his zoomorphic shrine, much the same



4. Anubis hut, restored perspective (from Badawy, *Dessin Architectural*).

as that of the cult object of Min into his edicule. No suggestion can be offered about the interior of the shrine, except that it was open on the front and accessible through a back service door.

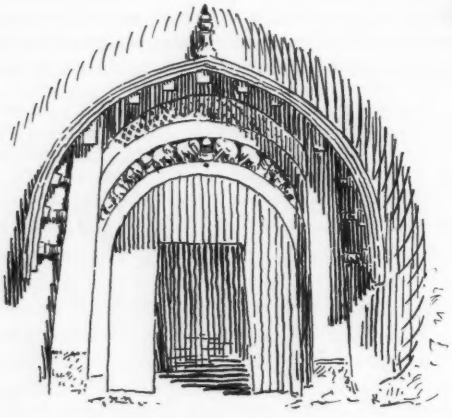
In India the Buddhist chaitya-hall or congregational temple, whether it be cut in rock or built as a free-standing stone structure, presents striking similarities to the zoomorphic Egyptian shrine in its general shape. It imitates an early wood and thatch construction,[3] similar to the contemporary vaulted huts of the Toda tribes. Its shape (fig. 5), featuring a vault over a long rectangular plan with an apsidal end and an elaborate front entrance, recalls that

1. Alexandre Badawy, *Le Dessin Architectural chez les Anciens Egyptiens* (Cairo, 1948), pp. 17–21.

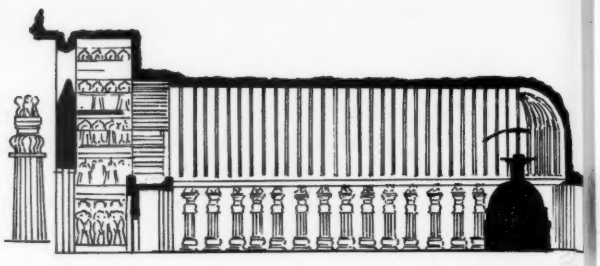
2. Herbert Ricke, *Beiträge zur Ägyptischen Bauforschung und Altertumskunde, Heft 4, Bemerkungen zur Ägyptischen Baukunst des Alten Reichs* (Cairo, 1944), I, 29–31.

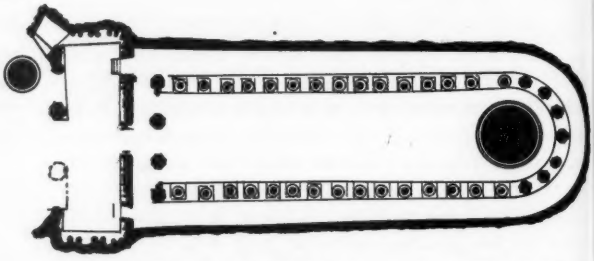
3. The few pegs jutting out horizontally from the upper part of the façade of the Anubis hut and resembling horizontal horns could be the remains of functional elements kept traditionally. Similar ones occur at both ends of the gabled roof of the Ise traditional sanctuary in Japan. See Robert T. Paine and Alexander Soper, *The Art and Architecture of Japan* (Baltimore, 1955), p. 166, pl. 119B; Benjamin Rowland, *The Art and Architecture of India* (Baltimore, 1953), pp. 21–22; Heinrich Zimmer, *The Art of Indian Asia* (New York, 1955), pp. 246–253, pl. A 3a.

5. Brushwood hut, Nilgiris tribes, India (after Zimmer, *Art of Indian Asia*).



6. Buddhist monk's cell, façade, Barabar, third century B.C. (after Rowland, *Art and Architecture of India*).



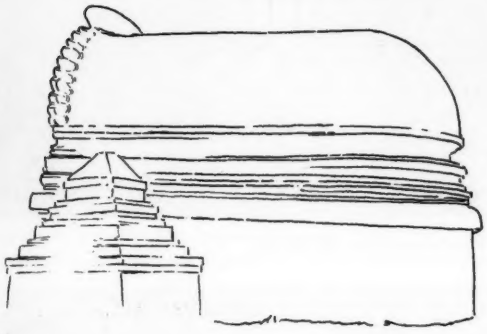


7. Rock-cut chaitya-hall, Karli, first century B.C. (after Rowland, *India*).

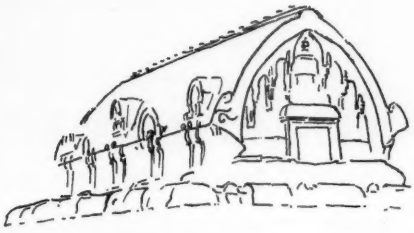
8. Chaitya-hall, entrance façade, Bhaja, second century B.C. (after Rowland, *India*).

of the so-called Anubis shrine from Egypt. Although the earliest rock-cut chaitya-hall at Bhaja dates only from the second century B.C.,[4] we may presume that independent shrines in light materials were built at a much earlier period. Timber for the entrance façade screen and the ribs of the vault was used even in the early rock-cut examples.[5] The main cult object is a stupa cut from the bedrock and rising at the center of the apse. Its ideology is basically cosmic. It is noteworthy that even on the façades of the monk cells similar to that of the chaitya-hall at the Lomas Rishi cave (fig. 6), as well as in the entrance transept and the hall itself, the elephant assumes an outstanding rôle in the themes of ornamental composition. This animal is sometimes represented in low relief walking processionally toward a stupa, as on the arched tympanum on the façade of the Lomas Rishi cave. Or three elephants may be represented in high relief on either side of the entrance transept as at Karli (fig. 7). Or again elephants with riders may form the top part of the capitals of inner colonnades. In the latter case the elephant seems to carry the whole structure.[6] The later free-standing Hindu chaitya-hall is an exact reproduction of the Buddhist rock-cut one (fourth-seventh centuries A.D.) (fig. 9),[7] even to the imitation of an elephant's back by the cross section of the ogee vault (fig. 10).[8]

4. Rowland, *India*, p. 70, fig. 6.
5. Rowland, *India*, p. 71, pl. 28
6. Rowland, *India*, p. 72, fig. 7.
7. Rowland, *India*, p. 131, pl. 75 A.
8. Rowland, *India*, p. 166.



9. Free-standing chaitya-hall, fourth century A.D. (after Rowland, *India*).



10. Vault in the shape of elephant's back, Mamallapuram, seventh century A.D. (after Rowland, *India*).

The use of the elephant in the religions of India has cosmic fertility implications. He is the vehicle of Indra and is known as Aivarata, representing rainbow and lightning as the most conspicuous manifestations of thunder and rain.[9] He is also the 'cloud' which gives rain.[10] He is a caryatid of the universe,[11] and as such he carries both ends of the transept in the chaitya-hall at Karli. A white elephant still walks in the procession at the yearly festival for fertility in India.[12] In the myth of Siva as slayer of the elephant-demon he conquers an elephant monster, dons his skin, and does a dance of triumph inside it.[13]

On the evidence of such symbolism could there be, as in the Egyptian zoomorphic shrine, a representation of the elephant in the form of the Indian chaitya-hall? The cosmic ideology would allow for such an implication of the 'cloud', represented by the chaitya-hall, above Mount Meru or the World, represented by the stupa. This would not be alien to the architectural concept of cosmic fertility, but it would rather place the emphasis on its most active agent: the rain-cloud which envelops the world and its congregation of worshippers. It would also be in agreement with the *pratibimba* concept of architectural symbolism in India according to which mountains and supernatural things could be imitated in architecture.

9. Heinrich Zimmer, *Myths and Symbols in Indian Art and Civilization* (New York, 1947), pp. 61, 104.
10. Zimmer, *Myths*, pp. 106, 109. Zimmer, *Indian Asia*, p. 161.
11. Zimmer, *Indian Asia*, p. 160.
12. Zimmer, *Myths*, p. 108.
13. Zimmer, *Indian Asia*, pp. 359–360, pls. 408, 445.

AMERICAN NOTES

'Fachwerkbau' Houses in Wisconsin

RICHARD W. E. PERRIN

Richard W. E. Perrin, Executive Director of the Housing Authority of the City of Milwaukee and A.I.A. Preservation Officer for the State of Wisconsin, has sent us the following essay, illustrated with his own drawings and photographs. The nogged-frame types exhibited are scarce in this country, but there are a few other examples such as the Moravian schoolhouse (now in ruins) in the Oley Valley, Pennsylvania, and the Herrmann-Oheim house at Kimmswick, Missouri.

Dodge and Washington[1] counties, west and north of Milwaukee, were created in 1836, the year in which Wisconsin was set up as a territory. The territorial period lasted until 1848, when statehood was conferred. In this period some interesting and unusual structures were erected by German settlers, principally from Pomerania, Brandenberg, Mecklenburg, and Silesia. Some of these buildings are still standing. For their first houses, the early settlers made expedient use of the timber provided by the surrounding forests. These structures were squared log houses known as 'Blockhaüser'. The severity of the climate and the urgency of providing some kind of shelter sometimes compelled as many as four families to live in one small 'Blockhaus' until it was possible to build additional dwellings for all of them.[2] The settlers were not the poorest immigrants,

1. Washington County originally extended east to Lake Michigan, embracing present-day Ozaukee County.

2. *Geschichte der Evangelisch-Lutherischen Davids Stern Gemeinde zu Kirchhayn, Wisconsin* (Northwestern Pub. House, Milwaukee, 1918), p. 10.

since some means were required to defray the Atlantic passage and the cost of transportation from New York to Wisconsin by sailing vessel via the Great Lakes. Widows and others of limited means were assisted by somewhat better situated friends and relatives.[3]

When the first and hardest part of pioneering was done, the higher achievements of civilization followed. Sawmills and gristmills arose where a brook or a river afforded water power, and around these mills grew hamlets, towns, and villages. Among the German settlers coming into the area were skilled craftsmen, including carpenters, joiners, cabinetmakers, stonemasons, and blacksmiths. Some of the timber houses built by these trained carpenters and joiners exhibited a degree of workmanship and skill which was completely lost in some of the later buildings. The type of construction was actually a form of half-timber work common in Europe during the Middle Ages.[4] In German, this is known as 'Fachwerkbau'.[5] The local name for 'Fachwerkbau' in Washington and Dodge counties is 'deutscher Verband'. A house of this kind was built of heavy timbers mortised, tenoned, and pegged together. The spaces between the timbers were filled with either kiln-fired brick, air-dried brick, rubble masonry, or clay and straw on wood slats. The latter seems to have been the most primitive and in some cases was replaced by more durable materials. The Langholff house near Watertown in Dodge County (fig. 1) is a good example, as will be seen from the detail (fig. 2). The earliest type of filling consisted of wood staves let into the horizontal timbers which were then covered with straw and mud and pargetted with lime plaster. Replacement nogging in adjoining panels was of handmade kiln-fired brick. The Langholff house is believed to have been built about 1848 and is the only 'Fachwerk' structure thus far discovered which accommodated both house and barn under one roof. A central stair hall separated the dwelling quarters from the stable and at the end of the stair hall was situated a vaulted brick, walk-in, bake oven which was also used for the smoking and curing of meat. The stable part

3. *Ibid.*, p. 10. Translation. 'To the credit of the settlers, it must be said that a spirit of helpfulness prevailed. Those who had more than the down-payment money shared it with the less fortunate and bought 40 acres for the poor. These, again, helped to clear the land by felling trees, building rail fences, and burning the rubbish. One acre of land cost ten shillings, 40 acres cost $50.00, and to clear an acre cost $10.00.'

4. See Russell Sturgis, *A Dictionary of Architecture and Building*, II, 344. 'Composed of timber so far as the framing is concerned, the spaces of which framing are then filled in with masonry in some form; this is the more usual meaning given to the term, but certain British authorities claim that such building as this is really whole-timbered, the filling in by means of masonry having nothing to do with the construction in timber.'

5. *Meyers Konversations-Lexikon*, VI, 131. Translation. 'As opposed to solid timber construction, a system of wood framing in which sills, posts, girts, and braces are connected into an open frame in which the panels are filled with brick, clay, or stone, and eventually plastered over.'

1. Watertown, Langholff House.

2. Watertown, Langholff House, detail of framing and nogging.

3. Kirchhayn, Krause House.

4. Jackson, Koepsel House.

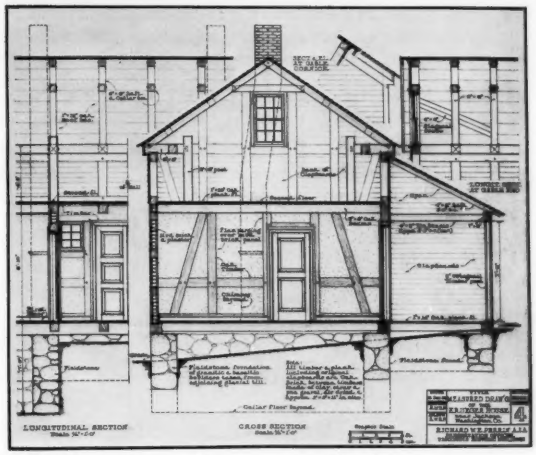
of the building was used to shelter cattle and horses, a hayloft having been provided above. Sheep, swine, and poultry were sheltered in separate buildings.

The timber employed in Wisconsin 'Fachwerkbau' was generally white oak, although some buildings such as the Krause house near Kirchhayn in Washington County (fig. 3) were built of cedar taken from nearby swamps. While there are some distinct variations in framing technique, a heavy sill was generally laid upon a fieldstone[6] foundation close to the ground and the floor beams were mortised to it. At the corner, and near the center, posts were erected extending the full height to the rafter plate. The end panels were always braced diagonally. Intermediate posts,[7] usually one story high, were then placed to frame the openings for the doors and windows. At the second floor level, a girt was mortised into the through posts, carrying all around the house, and the second floor beams were notched into this girt. The second floor walls were framed like those below, topped by a timber plate into which the rafters were heeled. Rafters frequently were poles of cedar or tamarack, with one side flattened only enough to secure the roof boards. In other instances, the rafters were as carefully hewn and framed as the rest of the structure. No nails were employed in the frame as all joints were mortised and tenoned, and secured with oak pegs. Each timber was carefully marked with a Roman numeral chiselled into its side to identify its relative position in the frame. Interior partitions were also built of timber, the panels being nogged with the same material as the outside walls. A thin coat of lime plaster was frequently trowelled over the entire wall.

Perhaps the most impressive 'Fachwerk' house still in existence is the old Koepsel house on the Butt farm in the town of Jackson, Washington County. The framing was done with great care, and while the house is in ruinous condition, the skill of its builder is evident. It is known that Koepsel, besides being a farmer, was a trained German 'Zimmermann', who built this house about 1860 for his own use, and very probably built a number of timber houses and barns in the vicinity. The Koepsel house (fig. 4) is two stories high, with a full loft which served as sleeping quarters for the hired men. The house has a central hall, and a symmetrical arrangement of rooms on the first and second floor. The nogging between timbers is handmade, sand-mold, kiln-fired brick of buff color.

6. Fieldstone is the local term for boulders, mostly of basaltic and granitic origin, found in the glacial deposits (till) with which most of southeastern Wisconsin is covered. Local German term is 'Feldstein' or 'Findling'.

7. The spacing and framing of intermediate posts differentiates two major types of 'Fachwerkbau'. They are 'Ständerbau' and 'Rahmenbau'. Wisconsin specimens are 'Rahmenbau'. For detailed description of difference see Ernst Neufert, *Bauentwurfslehre* (Berlin), p. 32.



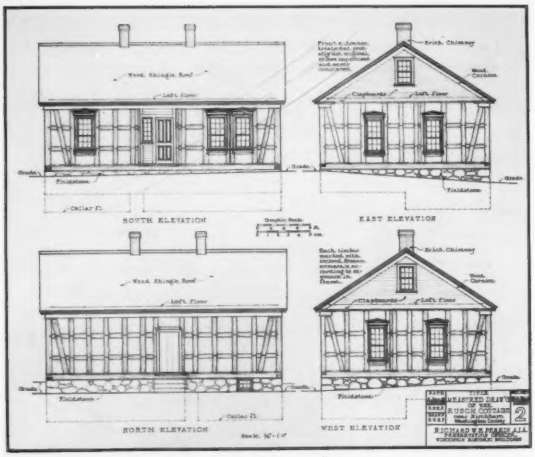
5. Kirchhayn, Krueger House, measured drawing.

Another early German 'Zimmermann' was (Gottlieb) Krueger. The house (fig. 5) he built for himself *c.* 1848 is also in the town of Jackson near Kirchhayn. This house, situated on the Arthur Miske farm, is 26′ × 44′ in size and is also symmetrical in plan, with a central hall running through the house. The panels between timbers of this house are filled with handmade, air-dried, mud bricks 5″ × 4″ × 10½″ in size and laid in mud mortar. The Krueger house is covered with oak clapboards. It is not known whether this treatment is original or a later addition. The condition of the clapboards suggests many years of exposure. It is therefore surmised that when the air-dried mud brick nogging and lime plaster pargetting were found not to stand the extremes of temperature too well, clapboarding was applied.

Another building of great interest in the Kirchhayn vicinity is the old cottage (fig. 6) on the Fred Rusch farm. Unlike its contemporaries, the timber is pine. Here, again, the original nogging seems to have been clay mixed with pea-gravel and straw, applied to vertical slats set between the timbers, and replaced, in part, with burned brick. Several fine, unpainted, raised panel doors are still in the building. Window and door openings were embellished on the outside with curious little pediments of 'Biedermeier' character.

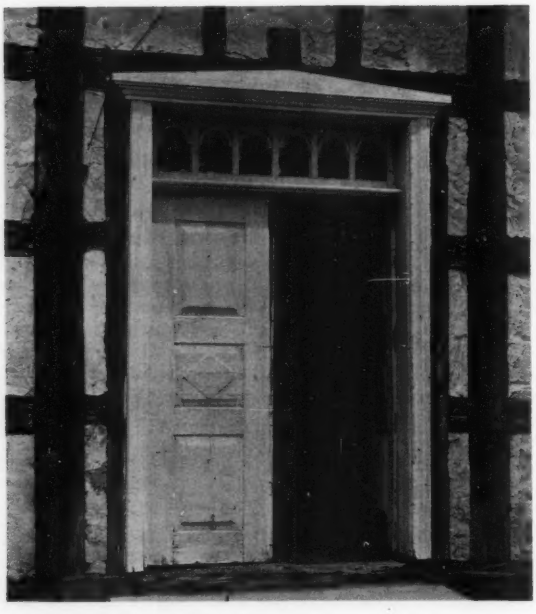
'Fachwerkbau' was used not only for houses and barns, but also for churches. Unfortunately, no church buildings have survived, but information is available concerning such a church at Woodland in Dodge County and the second church known to have been built at Freistadt,[8] Ozaukee County, by Trinity Evangelical Lutheran Congregation in 1844. The Woodland church was built by St. Paul's Evangelical Lutheran Congregation about 1860.

8. Roy A. Suelflow and August R. Suelflow, *History of Trinity Lutheran Congregation 1839–1954*, pp. 11, 12.



6. Kirchhayn, Rusch Cottage, measured drawing

7. Watertown, Kuenzi Barn.



8. Kirchhayn, Krause House, entrance.

The nogging between the timbers was red Hustisford brick. The parsonage was situated at the back end of the church building. The pulpit was in the center of the east wall of the church and was accessible directly from the parsonage. St. Paul's Church was demolished about 1891.

Among the best surviving examples of barns built of 'Fachwerk' is the Kuenzi barn (fig. 7) in the vicinity of Watertown. It is believed to have been built about 1850 by Ferdinand Paetsch. The timber is oak and the nogging is of red Hustisford brick with exceptionally interesting color variations.

None of the 'Fachwerk' buildings contained fireplaces, as the Germans, unlike their early Irish and Yankee neighbors, heated their houses with stoves. Most of the houses were equipped with two small, but solid, brick chimneys. If the chimney had to be inclined to bring it out of the roof at the center of the ridge, it was frequently supported by a permanent timber plank slanting in the proper direction. What little millwork was used was generally of local origin, although it is believed that the earliest window sash and panel doors were transported from considerable distances. The entrance of the Krause house (fig. 8) is a good example of early woodwork.

Despite the similarity of 'Fachwerk' buildings in Dodge and Washington counties, there are a number of well-defined differences, which may be traceable to the area of origin of the builder. Generally speaking, however, the Wisconsin houses could be classified as Saxon 'Bauernhaus'.[9]

As stated, the builders of Wisconsin 'Fachwerkbau' came from the eastern provinces of Germany. They were the descendants of Saxons and Franks, who migrated into eastern Germany as pioneers and settlers in the eleventh and twelfth centuries. Coming to Wisconsin 700 years later, traditional methods of construction were continued despite the trend toward lighter construction which was already developing in most American cities, including newly formed settlements in Wisconsin. The old method was slow, requiring great skill, and presumably becoming increasingly expensive. The balloon frame, appearing in Chicago as early as 1833, substituted the use of light strips of sawn lumber pieces, 2″×4″ and 2″×6″ being the standard for the framing of walls extending through the entire height of the building and held together entirely by nails. Such framework could be rapidly assembled on the ground and then raised to an upright position by a few hands. This method, together with the growing availability of sawn lumber and millwork and its widespread distribution

9. *Meyers Konversations-Lexikon*, II, 570. Two major types are described. They are the Low German 'niederdeutsch' or Saxon, and the High German 'oberdeutsch' or Franconian-Thuringian. These two basic types are further subdivided into nine regional variations which are differentiated not only as to the type of 'Fachwerkbau', but also as to general form and disposition of component parts, as well as differences in plan and layout of rooms.

by railroad after 1860, made possible the building of houses by the thousands in the ever-expanding cities and new industrial centers. In the frontier areas and the somewhat isolated settlements, such as those in Washington and Dodge counties, the old method of timber building continued well into the Civil War period. In the period of restlessness that followed, the simple qualities of the earlier houses were gradually lost as the people became style conscious and their houses were copied from the latest handbooks provided by purveyors from the city lumberyards. Of the probable hundreds of 'Fachwerk' buildings erected in the middle years of the nineteenth century in Dodge and Washington counties, only sixteen identifiable structures have been found. It is hoped that at least the best of these may, somehow, be preserved for posterity.

Brickmaking in Baltimore, 1798

LEE H. NELSON

Architect Lee Nelson of the National Park Service, after investigating Fort McHenry at Baltimore last summer, reports two items which throw a great deal of light on early brickmaking practices in that community. It is a subject on which we have very little literature. An amusing parallel in the making of adobes we published in 'Santa Barbara Work Load, 1793–95' (American Notes, *JSAH* XIII, No. 4, pp. 28–29). Related also is 'Dutch Brick for Baltimore, 1816' (American Notes, *JSAH* XIII, No. 1, pp. 26–27). We would like more contributions to the history of American building materials.

The physical appearance of Fort McHenry and the inner buildings during the 13–14 September 1814 British bombardment (which furnished the setting for 'The Star Spangled Banner') was largely the result of alterations and additions to Fort Whetstone, an earlier work of fortification on the same site. This period of augmentation took place from 1798 to 1800.

The variety of brick sizes used in construction at the fort suggests a laissez-faire approach by the Baltimore brick manufacturers. The city fathers took notice of this problem and, by passing Ordinance No. 64,[1] on 6 January 1798, attempted to '. . . regulate the size and dimensions of bricks, made within the city of Baltimore, or offered for sale within the same', as follows:

Be it enacted and ordained by the Mayor and City Council of Baltimore that all bricks brought into the City of Baltimore for sale (Except those imported from foreign Countries and those already made) shall not be less than the following dimensions, to wit, Place brick,[2] nine Inches long, two Inches and One-half of an Inch thick and four Inches and One Quarter of an Inch wide; The Stock Brick[3] not less than nine Inches Long, two Inches and five Eighths of an Inch thick, and four Inches and One Quarter of an Inch wide; and if any Person or Persons shall Sell to any Person for use Within the City of Baltimore or Exportation any Place or Stock bricks of less size than before prescribed Every such person shall forfeit and pay One dollar for Every thousand bricks and so pro rata for any less Numbers so Sold, One half thereof to the Informer and the Other half for the use of the City.

1. The original manuscript of this ordinance is preserved in the Baltimore City Archives, City Hall, Baltimore, Md.
2. Now known as a salmon or back-up brick.
3. A stock brick is now equivalent to a face brick.

Following approval of this ordinance, Baltimore brickmakers banded together for redress to the Mayor and city council and petitioned for repeal of the ordinance. The following petition is a particularly revealing document pertaining to contemporary brickmaking. Credit is due to Wilbur H. Hunter, Jr., Director, Peale Museum, Baltimore, for bringing this manuscript to my attention.

To the Honourable the Mayor and city council of the City of Baltimore[4]

The Memorial of the brick makers in the said City Humbly Sheweth—That to make bricks with strong clay, Agreable to the ordinance passed at your last Cession respecting the regulating and establishing the size of brick in this City, will be inconvenient and injurious to us, in the following particulars Viz.

First. In digging clay, The present rule of measuring will not hold good, by one fourth.

Secondly. In tempering the clay, the temporer has already a sufficiency of labour to perform in his days work to make bricks of the present size, to enlarge the size would be adding a fourth to his labour—The wheeler will have the same—

Thirdly. In moulding the clay, We take the liberty of stating to you the size of the present mould Viz 9½ Inches long 4⅞ broad 2½ In. Thick.[5] a walk or lump of clay to make a proper brick in this mould will weigh eleaven pounds. a Mould to make a brick of the size contemplated in the ordinance must be 10½ long–5. Wide 2¾ Inches thick which make a difference of 2½ lb. of clay in every brick adding to the already sufficient labour of the moulder 5½0lb of clay which he has to cut down with his hands from the body of Clay on his Table and to lift with his arms extended to fill the mould and make the brick, a degree of labour which we deem unreasonable and few men who now understand moulding will be competent to the task, besides the almost impossibility to lay down the brick so as to have it square.

Fourthly. The inconvenience & injury will be greater to the offbearer (a boy of from 10 to 15 years of age) The addition of labour to him will be enormous he will not be able to lay down the brick to have it in its proper shape. nor take it into the Shed.

Fifthly. We shall labour under a great inconvenience in drying the bricks.

1. The floors must be enlarged on which the bricks are laid to dry.
2. The bricks must be moulded with softer clay which will require more time to dry.
3. The bricks being longer broader & thicker will still contribute to the time for drying and as they are larger and much heavier of course ought to be dry before they are handled, or be spoiled in handling.

In this particular we are deprived of the labour of the boy, the brick being as much as he can grasp, perhaps softer than it ought to

4. Baltimore City Archives, Box 2, 1798, doc. no. 150.
5. The present standard brick size of 8″×3¾″×2¼″ requires a mold of approximately 9⅞″×4⅜″×2½″, depending upon the shrinkage during firing.

be, and heavy his small hand cannot lift it, without leaving the imprint of his thumb and fingers to the ruin of the brick.

4. The method heretofore pursued for taking them in, must be intirely altered. The moulder finishes the moulding part of his days work of the present size brick by two O Clock P.M. at which time bricks made the day before are dry (if the weather is fair) and fit to take in, but the size brick contemplated in the ordinance cannot be made by that time in the day and if the moulding could be done the brick could not be dry consequently we must have instead of one, two days work always on the floor, always liable to be caut in the rain. The most of us imploy fromThree to six gangs and of the present size brick have three days work Which is Seven thousand for each gang in cloudy weather on the floor at once, so that we must conclude we shall have four times the number of washed brick we now have, beside protracting the time in the Spring for beginning and contracting the time in fall for concluding brickmaking for at these seasons the ground is damp and the weather unsettled, and at best we can work but seven months in the year at manufacturing brick, here we shall loose perhaps a months time.

Sixthly. It would greatly injure us on account of the construction of our Kiln, They are built according to the present size of brick calculated to receive a certain number of bricks of the Identical size they are now made between the arches. The size required by the ordinance could not be sett between these arches, because the enhanced size deminished the opening of the Arch, which in fact must be larger instead of being less. The consequence that follows is that our Kilns which cost from three to four Hundred Dollars must be taken down and rebuilt.

We might enlarge upon the addition of wood to burn these bricks, perhaps not less than ten cord more for every kiln a longer time in burning a less number many more among them soft, and the many altercations with Troublesome persons about the size of them, as we are well asured with all the pains that can be taken the size will be irrigular. The extra expence in hawling to buildings to every five Hundred brick not less than 750 lb. in addition to every load of a Cart and two horses but we forbear!

Your memoriallists know not the motive that induced the corporation to take up this matter, but suppose it was to lessen the expense in building, when the reasons we have stated are reconsidered, we doubt not but the corporation will concur in opinion with us that to lessen the expense, it would be a more probable, and more desirable means to Mitigate the labour and avoid the difficulties as much as possible. We have not the least Idea of your having any intention to injure us or oppress the labourer by laying a greater burthen on him then he is able to bear in the contemplated alteration of the size of brick.

If any of you gentlemen have been at our brickyard, you have no doubt observed four black Men for one white man, this is not owing to the wages, no labour in this City affords better wages than brickmakers give to their labourers, but merely because of the extream hard labour, if this could be lessened, it would incourage poor white men and boys to come to the brickyard for imployment. Bricks would then be made better and give more satisfaction to the buyer and Seller.

We therefore hope the ordinance will be repealled.
And as in duty bound will ever pray.

John Hagerty	Josiah Brown	William Krebs
George Warner	Luke & William Ensor	George Sumvalt
J. Myers	John Mc Donogh	John Hignot
Jacob Shriver	John Allbright	Michael Warner
	Christopher Hughes	Henry Nagle

The efficacy of this rather obliquely reasoned petition, which is still on file in the excellent archives of the Baltimore City Hall, is amply demonstrated by the hasty repeal of the original. Without any published explanation, the repealing ordinance was approved 28 February 1798.

BOOKS

Whitney S. Stoddard, *Adventure in Architecture, Building the New St. John's*, plans by Marcel Breuer (New York: Longmans, Green and Company, 1958), 127 pp., 91 pls. $8.50.

The chief interest of this study lies in the picture it gives of the effective collaboration of patron and architect in the evolution of a complex architectural project. A step by step process is traced starting from the 1951 appointment of a committee to explore the specific problems of proper accommodations for aged and infirm members of the monastery of St. John the Baptist, Collegeville, Minnesota. The problems confronting the community are outlined and the procedures they followed in choosing and working with Marcel Breuer, the architect, clearly presented. A general plan for a hundred years of architectural development was worked out, the first unit built, and the designs for the second building campaign carefully refined. As the text of this book ends, the final drawings for the new church and some related structures were being prepared after revisions approved in March of 1957. The illustrations document the buildings as they were and are, and there are drawings from first sketches through later refinements, as well as two detailed models photographed from many angles. There are also a few photographs of individuals and of mediaeval monastic structures mentioned for comparisons.

The records of discussions and the correspondence between the monastic community and the architect were available, so the rational foundation for functional, structural, and aesthetic decisions can all be traced with a good deal of precision. One of the very interesting interchanges has to do with the mathematical proportions of the church. One of the monks, studying an early version of the plans and sections, discovered that it only required a minor adjustment to bring all dimensions into a system based on the golden section. The architect had not been aware of these relationships but made the adjustments and incorporated the mathematical ratios in later studies. The book offers many such interesting side lights on the development of the designs and provides a detailed guided tour of the completed building and the projected church group.

A few reservations suggest themselves, but none that materially effect the value of the study. It is too obvious that the book was planned in terms of the first 110 pages and a chapter added when

plans for the second building campaign were revised. The extra chapter is very worth-while, but considering the date when the revisions were accepted it would seem to have been simple enough to make a few changes in verb forms in Chapter v to avoid statements about the future which are later flatly contradicted. The references to early mediaeval monastic structures are also open to question. For example, it is implied (p. 50) that the only reason the early monasteries seem walled off from the outside world is due to the structural limitations of stone building. The point is that the monks of St. John's are not rigidly cloistered and their monastic building can and does take advantage of the open possibilities of reinforced concrete structure, but if comparisons were to be made they should have been complete enough to be illuminating. The specific example mentioned is particularly unfortunate as Fontenay, cited as an illustration, was built at a time when stone technology could have provided big windows had the monks been willing to have them.

The dust-jacket claim that this 'is the most exciting architectural story since the building of the great medieval churches in Europe . . .' may be discounted as hucksters' exaggeration, but the story is an exciting one, and the enthusiasm and skill with which it has been told help justify the title and make the record valuable.

HARRY H. HILBERRY
University of Delaware

David H. Pinkney, *Napoleon III and the Rebuilding of Paris* (Princeton: Princeton University Press, 1958), 245 pp., 20 pls. $6.00.

Studies abound on the subject of Napoleon III and the Haussmannization of Paris. It is an area where lines are usually pretty clearly drawn up: one is for or against. The defenders of Old Paris, Raval and Pillement, are ranged against Giedion, Morizet, and, most recently, J. M. and Brian Chapman, all of whom have generally welcomed the creation of the modern city. Mr. Pinkney's place is with the latter group, although partisanship is by far the least part of this excellently conceived summary of Napoleon III's ideas and Haussmann's accomplishments.

While the book is not exhaustive, most aspects of the Second Empire's rebuilding of Paris are at least partly illuminated. Emphasis is here given to the means by which the demolitions and constructions were achieved. The share of the two men in initiating and carrying out the huge project, and the varied sources of influence and inspiration are discussed with clarity and brevity. Not only the streets, parks, and monuments, but equally the water supply, sewers, and cemeteries, all integral parts of the city's modernization, figure in the narrative.

Considering the many facets of his subject, Mr. Pinkney has been remarkably thorough in handling so much in so compact a format. Furthermore, he has explored the archival sources as well as the rich font of memoirs and periodicals of the Second Empire. The approach is largely that of the historian, and the reader whose interest is keyed to architecture and the arts of city planning will perhaps feel that his areas have been slighted. The author makes no effort to supplant the existing literature on these matters, nor does he even really broach the subject of the Second Empire's architectural style. In fact, one or two references indicate that the author is far from sympathetic to Haussmann's architecture as architecture (if indeed it is proper to call it 'Haussmann's architecture').

For the reviewer the most fascinating passages in this book are concerned with ways and means (Chap. viii). The financing of the project, and especially Haussmann's ability to obtain credits without legislative or even ministerial approval may have led ultimately to his dismissal, yet relatively little actual construction would have been possible if everything had had to be paid out of budgetary surplus or bond issues. Interestingly, the financing methods were likely the 'invention' of Persigny and not of Haussmann (p. 180). For that matter, we must remember that the idea for building a modern city was Napoleon III's, not his prefect's. The latter was a great executant, at the furthest an elaborator of other people's ideas (as when he added the colossal sewer and water main projects to Napoleon's vision of monumental squares and avenues), but certainly not a creator. Although this picture ultimately grows out of a reading of the text, I do wish that the author had more emphatically stressed it. Haussmann was not an expansive, Rubensian urbanist, at once creator and marshal of lesser minds and industrious hands; far from it. Even in such matters as the 'Halles', the idea of an iron and glass pavilion was first put forward by the Emperor (pp. 77–78). His prefect then prevailed over the architect Baltard's hesitancy in using the new materials in place of the masonry piles. Haussmann's particular genius seems to have been his persistency and tenacity in gaining the ends sought by his superiors, administrative talents of the very first magnitude in the given circumstances, since Napoleon III rarely had the fortitude to persevere in the face of opposition. Doubtless the whole project would have fallen short or come to nought had Haussmann not been present to give the orders.

Quantitatively, what was achieved during these two decades was phenomenal, especially when it is compared to the little that has been accomplished by legislative oligarchies ever since. Qualitatively, the rebuilding of Paris offers a more delicate interpretive challenge, one that is chiefly art historical, for one must reckon with a host of personalities that are hardly mentioned by Mr. Pinkney. Certainly there were available architectural talents: Hittorff, Labrouste, Duban, and Léon Vaudoyer, to name some of the best qualified. Unfortunately much of the work was handed over to the conscientious, but limited, Victor Baltard, and some of the crucial monuments were left to people quite incapable of working on a monumental scale—Bailly at the Tribunal de Commerce and Ballu with La Trinité. Even when the academic forces produced a provocative design, it sometimes was at the expense of overpowering an important historical monument or area, as with Viollet-le-Duc's façade of the Palais de Justice which wrecks the scale of the Place Dauphine without obtaining for itself an axial vista so vital for its full appreciation. However, there were notable successes: the Opéra in its setting is an urban monument dominating a public square which has only rarely been equaled since, even though the architect was not satisfied with the cramped site.

Little of this aspect of Second Empire Paris figures in the present text. Nor is the author greatly concerned with oft repeated charges that Haussmann wantonly destroyed the Paris of the past, where certain compromises were perhaps possible. Instead Mr. Pinkney devotes two chapters to the work of Belgrand on 'Paris underground', the sewers and the water supply which are the natural and vital counterpart to the surface work, aspects of the program which were Haussmann's chief original contributions to the scheme and the importance of which Napoleon III never quite grasped. The pages on population growth and migrations from the countryside, and of the repressive measures that were considered to halt these trends, are absolutely essential aspects for rounding out the story. Of special interest is a discussion of the seasonal migratory construction worker in the Paris labor market.

The book is not definitive, at least not in the tedious sense of the word. It does not replace the sources or the numerous studies, nor does it make an amalgam. It approaches the subject freshly, with a new point of view and a different emphasis, while at the same time serving as an introductory text. There are some illustrations, but one could have wished for more. A larger map of Paris, perhaps with

the various projects more clearly indicated, would have been helpful, especially for those who are only superficially acquainted with the city's present layout. Without a large map the description of the new streets and their relation to the old ones is not always clear to any but a native Parisian. Otherwise this volume is to be heartily recommended for anyone devoted to the period. It is as fundamental as the other well-known investigations, and generally much more informative.

JOHN M. JACOBUS, JR.
Princeton University

Books Received

(Mention of a book here does not preclude its subsequent review.)

Kurt Baer and H. P. Rudinger, *Architecture of the California Missions* (Berkeley: University of California Press, 1958). $10.00.

Herbert A. Claiborne, *Comments on Virginia Brickwork Before 1800* (The Walpole Society, 1957). n.p.

D. T. Devendra, *Classical Singhalese Sculpture 300 B.C.–A.D. 100* (American distributor is Transatlantic Arts, Hollywood by the Sea, Fla., 1958). $6.50.

Erwin R. Goodenough, *Jewish Symbols in the Greco-Roman Period, Vols. 7 and 8, Pagan Symbols in Judaism* (New York: Pantheon Books, 1958). $15.00.

Frederick Hartt, *Giulio Romano* (New Haven: Yale University Press, 1958). 2 vols. $25.00.

Henry-Russell Hitchcock, *Architecture: Nineteenth and Twentieth Centuries* (Baltimore: Penguin Books, 1958). $12.50.

Christopher Hussey, *English Country Houses, Vol. III Late Georgian: 1800–1840* (Fairlawn, N. J.: Essential Books, 1958). $20.20.

Alfred B. James and Charles M. Stotz, *Drums in the Forest* (Pittsburgh: The Historical Society of Western Pennsylvania, 1958). $3.50.

George S. Koyl, ed., *American Architects Directory* (New York: R. R. Bowker Co., 1955).

John H. Kyle, *The Building of TVA: An Illustrated History* (Baton Rouge: Louisiana State University Press, 1958). $7.50.

Osbert Lancaster, *Here of All Places* (Boston: Houghton Mifflin, 1958). $4.00.

Claude J. W. Messent, *The Round Towers to English Parish Churches* (Norwich: Fletcher & Son Ltd., 1958). 30s.

John Peter, *Makers of Modern Architecture* (New York: George Braziller, 1958). $15.00.

J. M. Richards, *The Functional Tradition in Early Industrial Buildings* (London: The Architectural Press, 1958). 36s.

Donald R. Torbert, *A Century of Art and Architecture in Minnesota* (Minneapolis: University of Minnesota Press, 1958). $3.00.

Robert P. Walsh and Andrew W. Roberts, eds., *Charles Donagh Maginnis, A Selection of his Essays and Addresses* (New Haven: privately printed, 1958). n.p.

Rudolf Wittkower, *Art and Architecture in Italy 1600–1750* (Baltimore: Penguin Books, 1958). $12.50.

George Zarnecki, *Early Sculpture of Ely* (American distributor is Transatlantic Arts, Hollywood by the Sea, Fla., 1958). $6.50.

Periodicals Received

Archivo Espanol de Arte, Madrid, Spain.
No. 122. April–June, 1958.
No. 123. July – Sept. 1958.
José Maria de Azcarate, 'Iglesias Toledanas de tres Naves cubiertas con Bovedas de Cruceria'.

Journal of the Royal Society of Arts, London.
No. 5027, Oct. 1958.
No. 5028, Nov. 1958.
No. 5029, Dec. 1958.

S.A.H. NEWS

Book Award Winner

The Book Award Committee selected Marcus Whiffen's *The Public Buildings of Williamsburg* as the best book in the field of architectural history published in 1958 (the inclusive dates were 1 November 1957 through 31 October 1958). The author received the Alice Davis Hitchcock Medal as a token of his splendid work. The book is the first volume of the new series entitled Williamsburg Architectural Studies.

S.A.H. Annual Meeting

The yearly meeting of the Society was held in Cleveland in conjunction with that of the College Art Association on January 29, 30 and 31, 1959. In addition to the five sessions of speeches a bus tour was arranged for those wishing to see the fine architecture of the Cleveland area. The meeting next year will be held at New York.

Gaudi Archive

Columbia University has established an archive and research unit called Amigos de Gaudi—U.S.A. Photographs of Gaudi's architectural works and related material can be supplied by the archive for teaching and research purposes. They also have a collection of books and photostat source material. Further information may be obtained from Professor George R. Collins, Department of Fine Arts and Archaeology, Columbia University, New York 27, New York.

Avery Archive of Measured Drawings of Historic Monuments

The Avery Architectural Library has established this archive to facilitate advanced study of historic architecture, especially where questions of exact measurement are concerned. These drawings will be available to qualified scholars. The archive welcomes the donation of further drawings which are suitable to their use. For further information address the Chairman of the Faculty Committee, Avery Archive of Measured Drawings, Department of Fine Arts and Archaeology, Columbia University, New York 27, New York.